Appendix A

Fragmentation Results for All Allocators

In this appendix, we present the raw data obtained from each of our fragmentation experiments. We present the data in four sections: we first present the raw data measured using the allocator implementations. We then present the percent fragmentation for each of these allocators for each trace. Then, we present the raw data for each of our allocators, *accounting for all overheads*. Finally, we present the percent fragmentation for each of these allocators for each trace.

A.1 Memory Used by Each Allocator for Each Trace

In this section, we present the amount of memory, in bytes, used by each of the allocators for each of the programs. No attempt has been made to remove any of the overheads of our implementations.

Allocator Name	Waste	Allocator Name	Waste
binary buddy	3998204	first fit LIFO deferred LIFO	3653632
best fit AO	3108864	first fit LIFO no footer	3358720
best fit AO 8K	3112960	first fit LIFO split-14	3530752
best fit AO deferred AO	3108864	first fit LIFO split-7	3526656
best fit AO deferred FIFO	3518464	half fit	3379200
best fit AO deferred LIFO	3383296	Lea 2.5.1	3420160
best fit AO no footer	2953216	Lea 2.5.1 no footer	3268608
best fit FIFO	3108864	Lea 2.6.1	2953216
best fit FIFO no footer	2953216	multi-fit max	3383296
best fit LIFO	3108864	multi-fit min	3244032
best fit LIFO deferred AO	3108864	next fit AO	3117056
best fit LIFO deferred FIFO	3518464	next fit AO 8K	3112960
best fit LIFO deferred LIFO	3383296	next fit AO deferred AO	3383296
best fit LIFO no footer	2953216	next fit AO deferred FIFO	3657728
best fit LIFO split-14	3121152	next fit AO deferred LIFO	3387392
best fit LIFO split-7	3117056	next fit AO no footer	2957312
double buddy 10K	3154344	next fit FIFO	3117056
double buddy 5K	3205544	next fit FIFO no footer	2957312
first fit AO	3112960	next fit LIFO	3657728
first fit AO 8K	3112960	next fit LIFO deferred LIFO	3522560
first fit AO deferred AO	3108864	next fit LIFO no footer	3366912
first fit AO deferred FIFO	3518464	next fit LIFO split-14	3534848
first fit AO deferred LIFO	3321856	next fit LIFO split-7	3530752
first fit AO no footer	2953216	next fit LIFO WPH	3518464
first fit FIFO	3117056	simple segregated 2^N	4755456
first fit FIFO no footer	2957312	simple segregated $3 * 2^N$	4349952
first fit LIFO	3518464		

Table A.1: Memory used by each allocator for GCC

Allocator Name	Waste	Allocator Name	Waste
binary buddy	410108	first fit LIFO def LIFO	315392
best fit AO	315392	first fit LIFO no footer	315392
best fit AO 8K	319488	first fit LIFO split-14	319488
best fit AO def AO	315392	first fit LIFO split-7	315392
best fit AO def FIFO	315392	half fit	315392
best fit AO def LIFO	315392	Lea 2.5.1	327680
best fit AO no footer	290816	Lea 2.5.1 no footer	294912
best fit FIFO	315392	Lea 2.6.1	315392
best fit FIFO no footer	290816	multi-fit max	315392
best fit LIFO	315392	multi-fit min	315392
best fit LIFO def AO	315392	next fit AO	315392
best fit LIFO def FIFO	315392	next fit AO 8K	319488
best fit LIFO def LIFO	315392	next fit AO def AO	315392
best fit LIFO no footer	290816	next fit AO def FIFO	315392
best fit LIFO split-14	323584	next fit AO def LIFO	315392
best fit LIFO split-7	315392	next fit AO no footer	290816
double buddy 10K	422312	next fit FIFO	315392
double buddy 5K	424360	next fit FIFO no footer	290816
first fit AO	315392	next fit LIFO	315392
first fit AO 8K	319488	next fit LIFO def LIFO	315392
first fit AO def AO	315392	next fit LIFO no footer	315392
first fit AO def FIFO	315392	next fit LIFO split-14	315392
first fit AO def LIFO	315392	next fit LIFO split-7	315392
first fit AO no footer	290816	next fit LIFO WPH	319488
first fit FIFO	315392	simple segregated 2^N	724992
first fit FIFO no footer	290816	simple segregated $3 * 2^N$	757760
first fit LIFO	315392		

Table A.2: Memory used by each allocator for Espresso

Allocator Name	Waste	Allocator Name	Waste
binary buddy	1802748	first fit LIFO def LIFO	1720320
best fit AO	1327104	first fit LIFO no footer	3473408
best fit AO 8K	1327104	first fit LIFO split-14	3620864
best fit AO def AO	1314816	first fit LIFO split-7	3645440
best fit AO def FIFO	1314816	half fit	1314816
best fit AO def LIFO	1314816	Lea 2.5.1	1728512
best fit AO no footer	1294336	Lea 2.5.1 no footer	1691648
best fit FIFO	1327104	Lea 2.6.1	1290240
best fit FIFO no footer	1290240	multi-fit max	1318912
best fit LIFO	1339392	multi-fit min	1318912
best fit LIFO def AO	1314816	next fit AO	1544192
best fit LIFO def FIFO	1314816	next fit AO 8K	1507328
best fit LIFO def LIFO	1314816	next fit AO def AO	1331200
best fit LIFO no footer	1290240	next fit AO def FIFO	1355776
best fit LIFO split-14	1335296	next fit AO def LIFO	1331200
best fit LIFO split-7	1339392	next fit AO no footer	1486848
double buddy 10K	1495464	next fit FIFO	1855488
double buddy 5K	1505704	next fit FIFO no footer	1794048
first fit AO	1335296	next fit LIFO	3870720
first fit AO 8K	1343488	next fit LIFO def LIFO	2002944
first fit AO def AO	1314816	next fit LIFO no footer	3637248
first fit AO def FIFO	1314816	next fit LIFO split-14	3895296
first fit AO def LIFO	1314816	next fit LIFO split-7	3887104
first fit AO no footer	1294336	next fit LIFO WPH	3854336
first fit FIFO	1363968	simple segregated 2^N	1597440
first fit FIFO no footer	1335296	simple segregated $3 * 2^N$	1458176
first fit LIFO	3624960		

Table A.3: Memory used by each allocator for Ghostscript

Allocator Name	Waste	Allocator Name	Waste
binary buddy	274940	first fit LIFO def LIFO	491520
best fit AO	294912	first fit LIFO no footer	331776
best fit AO 8K	294912	first fit LIFO split-14	364544
best fit AO def AO	286720	first fit LIFO split-7	360448
best fit AO def FIFO	286720	half fit	286720
best fit AO def LIFO	286720	Lea 2.5.1	307200
best fit AO no footer	253952	Lea 2.5.1 no footer	274432
best fit FIFO	294912	Lea 2.6.1	253952
best fit FIFO no footer	253952	multi-fit max	303104
best fit LIFO	294912	multi-fit min	299008
best fit LIFO def AO	286720	next fit AO	315392
best fit LIFO def FIFO	286720	next fit AO 8K	319488
best fit LIFO def LIFO	286720	next fit AO def AO	339968
best fit LIFO no footer	253952	next fit AO def FIFO	372736
best fit LIFO split-14	294912	next fit AO def LIFO	356352
best fit LIFO split-7	294912	next fit AO no footer	274432
double buddy 10K	260520	next fit FIFO	319488
double buddy 5K	257448	next fit FIFO no footer	286720
first fit AO	290816	next fit LIFO	364544
first fit AO 8K	294912	next fit LIFO def LIFO	446464
first fit AO def AO	286720	next fit LIFO no footer	315392
first fit AO def FIFO	286720	next fit LIFO split-14	356352
first fit AO def LIFO	286720	next fit LIFO split-7	352256
first fit AO no footer	249856	next fit LIFO WPH	319488
first fit FIFO	294912	simple segregated 2^N	294912
first fit FIFO no footer	253952	simple segregated $3 * 2^N$	270336
first fit LIFO	356352		

Table A.4: Memory used by each allocator for Grobner

Allocator Name	Waste	Allocator Name	Waste
binary buddy	4194812	first fit LIFO deferred LIFO	2105344
best fit AO	2105344	first fit LIFO no footer	2101248
best fit AO 8K	2105344	first fit LIFO split-14	2117632
best fit AO deferred AO	2105344	first fit LIFO split-7	2117632
best fit AO deferred FIFO	2105344	half fit	2105344
best fit AO deferred LIFO	2105344	Lea 2.5.1	2105344
best fit AO no footer	2101248	Lea 2.5.1 no footer	2101248
best fit FIFO	2105344	Lea 2.6.1	2101248
best fit FIFO no footer	2101248	multi-fit max	2105344
best fit LIFO	2105344	multi-fit min	2105344
best fit LIFO deferred AO	2105344	next fit AO	2105344
best fit LIFO deferred FIFO	2105344	next fit AO 8K	2105344
best fit LIFO deferred LIFO	2105344	next fit AO deferred AO	2105344
best fit LIFO no footer	2101248	next fit AO deferred FIFO	2105344
best fit LIFO split-14	2117632	next fit AO deferred LIFO	2105344
best fit LIFO split-7	2117632	next fit AO no footer	2101248
double buddy 10K	3156392	next fit FIFO	2105344
double buddy 5K	3151272	next fit FIFO no footer	2101248
first fit AO	2105344	next fit LIFO	2105344
first fit AO 8K	2105344	next fit LIFO deferred LIFO	2105344
first fit AO deferred AO	2105344	next fit LIFO no footer	2101248
first fit AO deferred FIFO	2105344	next fit LIFO split-14	2117632
first fit AO deferred LIFO	2105344	next fit LIFO split-7	2117632
first fit AO no footer	2101248	next fit LIFO WPH	2105344
first fit FIFO	2105344	simple segregated 2^N	2654208
first fit FIFO no footer	2101248	simple segregated $3 * 2^N$	2654208
first fit LIFO	2105344		

Table A.5: Memory used by each allocator for Hyper

Allocator Name	Waste	Allocator Name	Waste
binary buddy	664060	first fit LIFO deferred LIFO	561152
best fit AO	552960	first fit LIFO no footer	503808
best fit AO 8K	557056	first fit LIFO split-14	565248
best fit AO deferred AO	548864	first fit LIFO split-7	565248
best fit AO deferred FIFO	548864	half fit	548864
best fit AO deferred LIFO	548864	Lea 2.5.1	577536
best fit AO no footer	499712	Lea 2.5.1 no footer	516096
best fit FIFO	552960	Lea 2.6.1	499712
best fit FIFO no footer	499712	multi-fit max	548864
best fit LIFO	552960	multi-fit min	552960
best fit LIFO deferred AO	548864	next fit AO	577536
best fit LIFO deferred FIFO	548864	next fit AO 8K	581632
best fit LIFO deferred LIFO	548864	next fit AO deferred AO	557056
best fit LIFO no footer	499712	next fit AO deferred FIFO	561152
best fit LIFO split-14	552960	next fit AO deferred LIFO	561152
best fit LIFO split-7	552960	next fit AO no footer	516096
double buddy 10K	553384	next fit FIFO	593920
double buddy 5K	550312	next fit FIFO no footer	524288
first fit AO	552960	next fit LIFO	606208
first fit AO 8K	557056	next fit LIFO deferred LIFO	569344
first fit AO deferred AO	548864	next fit LIFO no footer	544768
first fit AO deferred FIFO	548864	next fit LIFO split-14	598016
first fit AO deferred LIFO	548864	next fit LIFO split-7	598016
first fit AO no footer	499712	next fit LIFO WPH	577536
first fit FIFO	552960	simple segregated 2^N	741376
first fit FIFO no footer	495616	simple segregated $3 * 2^N$	610304
first fit LIFO	561152		

Table A.6: Memory used by each allocator for P2C

Allocator Name	Waste	Allocator Name	Waste
binary buddy	131580	first fit LIFO deferred LIFO	94208
best fit AO	94208	first fit LIFO no footer	90112
best fit AO 8K	98304	first fit LIFO split-14	94208
best fit AO deferred AO	94208	first fit LIFO split-7	94208
best fit AO deferred FIFO	94208	half fit	94208
best fit AO deferred LIFO	94208	Lea 2.5.1	94208
best fit AO no footer	90112	Lea 2.5.1 no footer	90112
best fit FIFO	94208	Lea 2.6.1	90112
best fit FIFO no footer	90112	multi-fit max	94208
best fit LIFO	94208	multi-fit min	94208
best fit LIFO deferred AO	94208	next fit AO	94208
best fit LIFO deferred FIFO	94208	next fit AO 8K	98304
best fit LIFO deferred LIFO	94208	next fit AO deferred AO	94208
best fit LIFO no footer	90112	next fit AO deferred FIFO	94208
best fit LIFO split-14	94208	next fit AO deferred LIFO	94208
best fit LIFO split-7	94208	next fit AO no footer	90112
double buddy 10K	106920	next fit FIFO	94208
double buddy 5K	106920	next fit FIFO no footer	90112
first fit AO	94208	next fit LIFO	94208
first fit AO 8K	98304	next fit LIFO deferred LIFO	94208
first fit AO deferred AO	94208	next fit LIFO no footer	94208
first fit AO deferred FIFO	94208	next fit LIFO split-14	94208
first fit AO deferred LIFO	94208	next fit LIFO split-7	94208
first fit AO no footer	90112	next fit LIFO WPH	94208
first fit FIFO	94208	simple segregated 2^N	126976
first fit FIFO no footer	90112	simple segregated $3 * 2^N$	135168
first fit LIFO	94208		

Table A.7: Memory used by each allocator for Perl

Allocator Name	Waste	Allocator Name	Waste
binary buddy	2515452	first fit LIFO deferred LIFO	1884160
best fit AO	1884160	first fit LIFO no footer	1572864
best fit AO 8K	1884160	first fit LIFO split-14	1884160
best fit AO deferred AO	1884160	first fit LIFO split-7	1884160
best fit AO deferred FIFO	1884160	half fit	1884160
best fit AO deferred LIFO	1884160	Lea 2.5.1	1884160
best fit AO no footer	1572864	Lea 2.5.1 no footer	1572864
best fit FIFO	1884160	Lea 2.6.1	1572864
best fit FIFO no footer	1572864	multi-fit max	1884160
best fit LIFO	1884160	multi-fit min	1884160
best fit LIFO deferred AO	1884160	next fit AO	1884160
best fit LIFO deferred FIFO	1884160	next fit AO 8K	1884160
best fit LIFO deferred LIFO	1884160	next fit AO deferred AO	1884160
best fit LIFO no footer	1572864	next fit AO deferred FIFO	1884160
best fit LIFO split-14	1884160	next fit AO deferred LIFO	1884160
best fit LIFO split-7	1884160	next fit AO no footer	1572864
double buddy 10K	1894824	next fit FIFO	1884160
double buddy 5K	1889704	next fit FIFO no footer	1572864
first fit AO	1884160	next fit LIFO	1884160
first fit AO 8K	1884160	next fit LIFO deferred LIFO	1884160
first fit AO deferred AO	1884160	next fit LIFO no footer	1572864
first fit AO deferred FIFO	1884160	next fit LIFO split-14	1884160
first fit AO deferred LIFO	1884160	next fit LIFO split-7	1884160
first fit AO no footer	1572864	next fit LIFO WPH	1884160
first fit FIFO	1884160	simple segregated 2^N	2547712
first fit FIFO no footer	1572864	simple segregated $3 * 2^N$	1933312
first fit LIFO	1884160		

Table A.8: Memory used by each allocator for LRUsim

Allocator Name	Waste	Allocator Name	Waste
binary buddy	68.27%	first fit LIFO deferred LIFO	53.77%
best fit AO	30.84%	first fit LIFO no footer	41.36%
best fit AO 8K	31.01%	first fit LIFO split-14	48.60%
best fit AO deferred AO	30.84%	first fit LIFO split-7	48.42%
best fit AO deferred FIFO	48.08%	half fit	42.22%
best fit AO deferred LIFO	42.39%	Lea 2.5.1	43.94%
best fit AO no footer	24.29%	Lea 2.5.1 no footer	37.56%
best fit FIFO	30.84%	Lea 2.6.1	24.29%
best fit FIFO no footer	24.29%	multi-fit max	42.39%
best fit LIFO	30.84%	multi-fit min	36.53%
best fit LIFO deferred AO	30.84%	next fit AO	31.19%
best fit LIFO deferred FIFO	48.08%	next fit AO 8K	31.01%
best fit LIFO deferred LIFO	42.39%	next fit AO deferred AO	42.39%
best fit LIFO no footer	24.29%	next fit AO deferred FIFO	53.94%
best fit LIFO split-14	31.36%	next fit AO deferred LIFO	42.56%
best fit LIFO split-7	31.19%	next fit AO no footer	24.46%
double buddy 10K	32.76%	next fit FIFO	31.19%
double buddy 5K	34.91%	next fit FIFO no footer	24.46%
first fit AO	31.01%	next fit LIFO	53.94%
first fit AO 8K	31.01%	next fit LIFO deferred LIFO	48.25%
first fit AO deferred AO	30.84%	next fit LIFO no footer	41.70%
first fit AO deferred FIFO	48.08%	next fit LIFO split-14	48.77%
first fit AO deferred LIFO	39.81%	next fit LIFO split-7	48.60%
first fit AO no footer	24.29%	next fit LIFO WPH	48.08%
first fit FIFO	31.19%	simple segregated 2^N	100.14%
first fit FIFO no footer	24.46%	simple segregated $3 * 2^N$	83.07%
first fit LIFO	48.08%		

Table A.9: Percent fragmentation for GCC

A.2 Percent Fragmentation for Each Allocator for Each Trace

In this section, we present the percentage of fragmentation for each of the allocators for each of the programs. No attempt has been made to remove any of the overheads of our implementations. Percentage fragmentation is measured as the percent above the maximum amount of memory requested by each trace, as described in Sectionmalloc:fragmentation-definition.

Allocator Name	Waste	Allocator Name	Waste
binary buddy	52.09%	first fit LIFO def LIFO	16.96%
best fit AO	16.96%	first fit LIFO no footer	16.96%
best fit AO 8K	18.48%	first fit LIFO split-14	18.48%
best fit AO def AO	16.96%	first fit LIFO split-7	16.96%
best fit AO def FIFO	16.96%	half fit	16.96%
best fit AO def LIFO	16.96%	Lea 2.5.1	21.52%
best fit AO no footer	7.85%	Lea 2.5.1 no footer	9.37%
best fit FIFO	16.96%	Lea 2.6.1	16.96%
best fit FIFO no footer	7.85%	multi-fit max	16.96%
best fit LIFO	16.96%	multi-fit min	16.96%
best fit LIFO def AO	16.96%	next fit AO	16.96%
best fit LIFO def FIFO	16.96%	next fit AO 8K	18.48%
best fit LIFO def LIFO	16.96%	next fit AO def AO	16.96%
best fit LIFO no footer	7.85%	next fit AO def FIFO	16.96%
best fit LIFO split-14	20.00%	next fit AO def LIFO	16.96%
best fit LIFO split-7	16.96%	next fit AO no footer	7.85%
double buddy 10K	56.62%	next fit FIFO	16.96%
double buddy 5K	57.38%	next fit FIFO no footer	7.85%
first fit AO	16.96%	next fit LIFO	16.96%
first fit AO 8K	18.48%	next fit LIFO def LIFO	16.96%
first fit AO def AO	16.96%	next fit LIFO no footer	16.96%
first fit AO def FIFO	16.96%	next fit LIFO split-14	16.96%
first fit AO def LIFO	16.96%	next fit LIFO split-7	16.96%
first fit AO no footer	7.85%	next fit LIFO WPH	18.48%
first fit FIFO	16.96%	simple segregated 2^N	168.87%
first fit FIFO no footer	7.85%	simple segregated $3 * 2^N$	181.02%
first fit LIFO	16.96%		

Table A.10: Percent fragmentation for Espresso

Allocator Name	Waste	Allocator Name	Waste
binary buddy	58.57%	first fit LIFO def LIFO	51.32%
best fit AO	16.73%	first fit LIFO no footer	205.52%
best fit AO 8K	16.73%	first fit LIFO split-14	218.49%
best fit AO def AO	15.65%	first fit LIFO split-7	220.65%
best fit AO def FIFO	15.65%	half fit	15.65%
best fit AO def LIFO	15.65%	Lea 2.5.1	52.04%
best fit AO no footer	13.85%	Lea 2.5.1 no footer	48.80%
best fit FIFO	16.73%	Lea 2.6.1	13.49%
best fit FIFO no footer	13.49%	multi-fit max	16.01%
best fit LIFO	17.81%	multi-fit min	16.01%
best fit LIFO def AO	15.65%	next fit AO	35.83%
best fit LIFO def FIFO	15.65%	next fit AO 8K	32.58%
best fit LIFO def LIFO	15.65%	next fit AO def AO	17.09%
best fit LIFO no footer	13.49%	next fit AO def FIFO	19.25%
best fit LIFO split-14	17.45%	next fit AO def LIFO	17.09%
best fit LIFO split-7	17.81%	next fit AO no footer	30.78%
double buddy 10K	31.54%	next fit FIFO	63.21%
double buddy 5K	32.44%	next fit FIFO no footer	57.80%
first fit AO	17.45%	next fit LIFO	240.47%
first fit AO 8K	18.17%	next fit LIFO def LIFO	76.18%
first fit AO def AO	15.65%	next fit LIFO no footer	219.93%
first fit AO def FIFO	15.65%	next fit LIFO split-14	242.63%
first fit AO def LIFO	15.65%	next fit LIFO split-7	241.91%
first fit AO no footer	13.85%	next fit LIFO WPH	239.03%
first fit FIFO	19.97%	simple segregated 2^N	40.51%
first fit FIFO no footer	17.45%	simple segregated $3 * 2^N$	28.26%
first fit LIFO	218.85%		

Table A.11: Percent fragmentation for Ghostscript

Allocator Name	Waste	Allocator Name	Waste
binary buddy	85.10%	first fit LIFO def LIFO	230.91%
best fit AO	98.54%	first fit LIFO no footer	123.36%
best fit AO 8K	98.54%	first fit LIFO split-14	145.42%
best fit AO def AO	93.03%	first fit LIFO split-7	142.67%
best fit AO def FIFO	93.03%	half fit	93.03%
best fit AO def LIFO	93.03%	Lea 2.5.1	106.82%
best fit AO no footer	70.97%	Lea 2.5.1 no footer	84.76%
best fit FIFO	98.54%	Lea 2.6.1	70.97%
best fit FIFO no footer	70.97%	multi-fit max	104.06%
best fit LIFO	98.54%	multi-fit min	101.30%
best fit LIFO def AO	93.03%	next fit AO	112.33%
best fit LIFO def FIFO	93.03%	next fit AO 8K	115.09%
best fit LIFO def LIFO	93.03%	next fit AO def AO	128.88%
best fit LIFO no footer	70.97%	next fit AO def FIFO	150.94%
best fit LIFO split-14	98.54%	next fit AO def LIFO	139.91%
best fit LIFO split-7	98.54%	next fit AO no footer	84.76%
double buddy 10K	75.39%	next fit FIFO	115.09%
double buddy 5K	73.32%	next fit FIFO no footer	93.03%
first fit AO	95.79%	next fit LIFO	145.42%
first fit AO 8K	98.54%	next fit LIFO def LIFO	200.57%
first fit AO def AO	93.03%	next fit LIFO no footer	112.33%
first fit AO def FIFO	93.03%	next fit LIFO split-14	139.91%
first fit AO def LIFO	93.03%	next fit LIFO split-7	137.15%
first fit AO no footer	68.21%	next fit LIFO WPH	115.09%
first fit FIFO	98.54%	simple segregated 2^N	98.54%
first fit FIFO no footer	70.97%	simple segregated $3 * 2^N$	82.00%
first fit LIFO	139.91%		

Table A.12: Percent fragmentation for Grobner

Allocator Name	Waste	Allocator Name	Waste
binary buddy	99.95%	first fit LIFO deferred LIFO	0.35%
best fit AO	0.35%	first fit LIFO no footer	0.16%
best fit AO 8K	0.35%	first fit LIFO split-14	0.94%
best fit AO deferred AO	0.35%	first fit LIFO split-7	0.94%
best fit AO deferred FIFO	0.35%	half fit	0.35%
best fit AO deferred LIFO	0.35%	Lea 2.5.1	0.35%
best fit AO no footer	0.16%	Lea 2.5.1 no footer	0.16%
best fit FIFO	0.35%	Lea 2.6.1	0.16%
best fit FIFO no footer	0.16%	multi-fit max	0.35%
best fit LIFO	0.35%	multi-fit min	0.35%
best fit LIFO deferred AO	0.35%	next fit AO	0.35%
best fit LIFO deferred FIFO	0.35%	next fit AO 8K	0.35%
best fit LIFO deferred LIFO	0.35%	next fit AO deferred AO	0.35%
best fit LIFO no footer	0.16%	next fit AO deferred FIFO	0.35%
best fit LIFO split-14	0.94%	next fit AO deferred LIFO	0.35%
best fit LIFO split-7	0.94%	next fit AO no footer	0.16%
double buddy 10K	50.45%	next fit FIFO	0.35%
double buddy 5K	50.21%	next fit FIFO no footer	0.16%
first fit AO	0.35%	next fit LIFO	0.35%
first fit AO 8K	0.35%	next fit LIFO deferred LIFO	0.35%
first fit AO deferred AO	0.35%	next fit LIFO no footer	0.16%
first fit AO deferred FIFO	0.35%	next fit LIFO split-14	0.94%
first fit AO deferred LIFO	0.35%	next fit LIFO split-7	0.94%
first fit AO no footer	0.16%	next fit LIFO WPH	0.35%
first fit FIFO	0.35%	simple segregated 2^N	26.51%
first fit FIFO no footer	0.16%	simple segregated $3 * 2^N$	26.51%
first fit LIFO	0.35%		

Table A.13: Percent fragmentation for Hyper

Allocator Name	Waste	Allocator Name	Waste
binary buddy	65.01%	first fit LIFO deferred LIFO	39.44%
best fit AO	37.40%	first fit LIFO no footer	25.19%
best fit AO 8K	38.42%	first fit LIFO split-14	40.46%
best fit AO deferred AO	36.39%	first fit LIFO split-7	40.46%
best fit AO deferred FIFO	36.39%	half fit	36.39%
best fit AO deferred LIFO	36.39%	Lea 2.5.1	43.51%
best fit AO no footer	24.17%	Lea 2.5.1 no footer	28.24%
best fit FIFO	37.40%	Lea 2.6.1	24.17%
best fit FIFO no footer	24.17%	multi-fit max	36.39%
best fit LIFO	37.40%	multi-fit min	37.40%
best fit LIFO deferred AO	36.39%	next fit AO	43.51%
best fit LIFO deferred FIFO	36.39%	next fit AO 8K	44.53%
best fit LIFO deferred LIFO	36.39%	next fit AO deferred AO	38.42%
best fit LIFO no footer	24.17%	next fit AO deferred FIFO	39.44%
best fit LIFO split-14	37.40%	next fit AO deferred LIFO	39.44%
best fit LIFO split-7	37.40%	next fit AO no footer	28.24%
double buddy 10K	37.51%	next fit FIFO	47.58%
double buddy 5K	36.75%	next fit FIFO no footer	30.28%
first fit AO	37.40%	next fit LIFO	50.64%
first fit AO 8K	38.42%	next fit LIFO deferred LIFO	41.48%
first fit AO deferred AO	36.39%	next fit LIFO no footer	35.37%
first fit AO deferred FIFO	36.39%	next fit LIFO split-14	48.60%
first fit AO deferred LIFO	36.39%	next fit LIFO split-7	48.60%
first fit AO no footer	24.17%	next fit LIFO WPH	43.51%
first fit FIFO	37.40%	simple segregated 2^N	84.22%
first fit FIFO no footer	23.16%	simple segregated $3 * 2^N$	51.65%
first fit LIFO	39.44%		

Table A.14: Percent fragmentation for P2C

Allocator Name	Waste	Allocator Name	Waste
binary buddy	85.95%	first fit LIFO deferred LIFO	33.14%
best fit AO	33.14%	first fit LIFO no footer	27.35%
best fit AO 8K	38.92%	first fit LIFO split-14	33.14%
best fit AO deferred AO	33.14%	first fit LIFO split-7	33.14%
best fit AO deferred FIFO	33.14%	half fit	33.14%
best fit AO deferred LIFO	33.14%	Lea 2.5.1	33.14%
best fit AO no footer	27.35%	Lea 2.5.1 no footer	27.35%
best fit FIFO	33.14%	Lea 2.6.1	27.35%
best fit FIFO no footer	27.35%	multi-fit max	33.14%
best fit LIFO	33.14%	multi-fit min	33.14%
best fit LIFO deferred AO	33.14%	next fit AO	33.14%
best fit LIFO deferred FIFO	33.14%	next fit AO 8K	38.92%
best fit LIFO deferred LIFO	33.14%	next fit AO deferred AO	33.14%
best fit LIFO no footer	27.35%	next fit AO deferred FIFO	33.14%
best fit LIFO split-14	33.14%	next fit AO deferred LIFO	33.14%
best fit LIFO split-7	33.14%	next fit AO no footer	27.35%
double buddy 10K	51.10%	next fit FIFO	33.14%
double buddy 5K	51.10%	next fit FIFO no footer	27.35%
first fit AO	33.14%	next fit LIFO	33.14%
first fit AO 8K	38.92%	next fit LIFO deferred LIFO	33.14%
first fit AO deferred AO	33.14%	next fit LIFO no footer	33.14%
first fit AO deferred FIFO	33.14%	next fit LIFO split-14	33.14%
first fit AO deferred LIFO	33.14%	next fit LIFO split-7	33.14%
first fit AO no footer	27.35%	next fit LIFO WPH	33.14%
first fit FIFO	33.14%	simple segregated 2^N	79.44%
first fit FIFO no footer	27.35%	simple segregated $3 * 2^N$	91.02%
first fit LIFO	33.14%		

Table A.15: Percent fragmentation for Perl

Allocator Name	Waste	Allocator Name	Waste
binary buddy	77.95%	first fit LIFO deferred LIFO	33.29%
best fit AO	33.29%	first fit LIFO no footer	11.27%
best fit AO 8K	33.29%	first fit LIFO split-14	33.29%
best fit AO deferred AO	33.29%	first fit LIFO split-7	33.29%
best fit AO deferred FIFO	33.29%	half fit	33.29%
best fit AO deferred LIFO	33.29%	Lea 2.5.1	33.29%
best fit AO no footer	11.27%	Lea 2.5.1 no footer	11.27%
best fit FIFO	33.29%	Lea 2.6.1	11.27%
best fit FIFO no footer	11.27%	multi-fit max	33.29%
best fit LIFO	33.29%	multi-fit min	33.29%
best fit LIFO deferred AO	33.29%	next fit AO	33.29%
best fit LIFO deferred FIFO	33.29%	next fit AO 8K	33.29%
best fit LIFO deferred LIFO	33.29%	next fit AO deferred AO	33.29%
best fit LIFO no footer	11.27%	next fit AO deferred FIFO	33.29%
best fit LIFO split-14	33.29%	next fit AO deferred LIFO	33.29%
best fit LIFO split-7	33.29%	next fit AO no footer	11.27%
double buddy 10K	34.05%	next fit FIFO	33.29%
double buddy 5K	33.68%	next fit FIFO no footer	11.27%
first fit AO	33.29%	next fit LIFO	33.29%
first fit AO 8K	33.29%	next fit LIFO deferred LIFO	33.29%
first fit AO deferred AO	33.29%	next fit LIFO no footer	11.27%
first fit AO deferred FIFO	33.29%	next fit LIFO split-14	33.29%
first fit AO deferred LIFO	33.29%	next fit LIFO split-7	33.29%
first fit AO no footer	11.27%	next fit LIFO WPH	33.29%
first fit FIFO	33.29%	simple segregated 2^N	80.23%
first fit FIFO no footer	11.27%	simple segregated $3 * 2^N$	36.77%
first fit LIFO	33.29%		

Table A.16: Percent fragmentation for LRUsim

Allocator Name	Memory	Allocator Name	Memory
binary buddy	3187999	first fit LIFO deferred LIFO	2654208
best fit AO	2383872	first fit LIFO no footer	2940928
best fit AO 8K	2383872	first fit LIFO split-14	2809856
best fit AO deferred AO	2650112	first fit LIFO split-7	2809856
best fit AO deferred FIFO	2785280	half fit	2789376
best fit AO deferred LIFO	2789376	Lea 2.5.1	2924544
best fit AO no footer	2383872	Lea 2.5.1 no footer	2924544
best fit FIFO	2383872	Lea 2.6.1	2383872
best fit FIFO no footer	2383872	multi-fit max	2789376
best fit LIFO	2387968	multi-fit min	2789376
best fit LIFO deferred AO	2650112	next fit AO	2392064
best fit LIFO deferred FIFO	2785280	next fit AO 8K	2390016
best fit LIFO deferred LIFO	2789376	next fit AO deferred AO	2523136
best fit LIFO no footer	2387968	next fit AO deferred FIFO	2883584
best fit LIFO split-14	2404352	next fit AO deferred LIFO	2674688
best fit LIFO split-7	2404352	next fit AO no footer	2392064
double buddy 10K	3120927	next fit FIFO	2396160
double buddy 5K	3120799	next fit FIFO no footer	2396160
first fit AO	2387968	next fit LIFO	2875392
first fit AO 8K	2384384	next fit LIFO deferred LIFO	2736128
first fit AO deferred AO	2519040	next fit LIFO no footer	2875392
first fit AO deferred FIFO	2654208	next fit LIFO split-14	2818048
first fit AO deferred LIFO	2519040	next fit LIFO split-7	2818048
first fit AO no footer	2387968	next fit LIFO WPH	2793472
first fit FIFO	2387968	simple segregated 2^N	4739584
first fit FIFO no footer	2387968	simple segregated $3 * 2^N$	4749568
first fit LIFO	2940928		

Table A.17: Memory used by each allocator for the GCC program, accounting for all overheads

A.3 Memory Used by Each Allocator for Each Trace, Accounting for All Overheads

In this section, we present the amount of memory, in bytes, used by each of the allocators for each of the programs. All implementation overheads have been removed from these results.

Allocator Name	Memory	Allocator Name	Memory
binary buddy	393247	first fit LIFO def LIFO	294912
best fit AO	270336	first fit LIFO no footer	294912
best fit AO 8K	270336	first fit LIFO split-14	299008
best fit AO def AO	270336	first fit LIFO split-7	299008
best fit AO def FIFO	270336	half fit	294912
best fit AO def LIFO	274432	Lea 2.5.1	299008
best fit AO no footer	270336	Lea 2.5.1 no footer	299008
best fit FIFO	270336	Lea 2.6.1	270336
best fit FIFO no footer	270336	multi-fit max	270336
best fit LIFO	270336	multi-fit min	299008
best fit LIFO def AO	274432	next fit AO	274432
best fit LIFO def FIFO	274432	next fit AO 8K	272384
best fit LIFO def LIFO	270336	next fit AO def AO	278528
best fit LIFO no footer	270336	next fit AO def FIFO	294912
best fit LIFO split-14	274432	next fit AO def LIFO	311296
best fit LIFO split-7	270336	next fit AO no footer	274432
double buddy 10K	454943	next fit FIFO	270336
double buddy 5K	454815	next fit FIFO no footer	270336
first fit AO	270336	next fit LIFO	294912
first fit AO 8K	270336	next fit LIFO def LIFO	270336
first fit AO def AO	270336	next fit LIFO no footer	294912
first fit AO def FIFO	270336	next fit LIFO split-14	294912
first fit AO def LIFO	270336	next fit LIFO split-7	299008
first fit AO no footer	270336	next fit LIFO WPH	303104
first fit FIFO	270336	simple segregated 2^N	707584
first fit FIFO no footer	270336	simple segregated $3 * 2^N$	699648
first fit LIFO	294912		

Table A.18: Memory used by each allocator for the Espresso program, accounting for all overheads

Allocator Name	Memory	Allocator Name	Memory
binary buddy	1572895	first fit LIFO def LIFO	1642496
best fit AO	1175552	first fit LIFO no footer	3170304
best fit AO 8K	1170944	first fit LIFO split-14	3190784
best fit AO def AO	1155072	first fit LIFO split-7	3178496
best fit AO def FIFO	1163264	half fit	1155072
best fit AO def LIFO	1155072	Lea 2.5.1	2101248
best fit AO no footer	1175552	Lea 2.5.1 no footer	2101248
best fit FIFO	1171456	Lea 2.6.1	1175552
best fit FIFO no footer	1171456	multi-fit max	1171456
best fit LIFO	1175552	multi-fit min	1171456
best fit LIFO def AO	1155072	next fit AO	1327104
best fit LIFO def FIFO	1155072	next fit AO 8K	1349120
best fit LIFO def LIFO	1155072	next fit AO def AO	1171456
best fit LIFO no footer	1175552	next fit AO def FIFO	1175552
best fit LIFO split-14	1179648	next fit AO def LIFO	1171456
best fit LIFO split-7	1171456	next fit AO no footer	1327104
double buddy 10K	1372959	next fit FIFO	1757184
double buddy 5K	1373087	next fit FIFO no footer	1757184
first fit AO	1175552	next fit LIFO	3411968
first fit AO 8K	1168384	next fit LIFO def LIFO	1695744
first fit AO def AO	1155072	next fit LIFO no footer	3411968
first fit AO def FIFO	1163264	next fit LIFO split-14	3403776
first fit AO def LIFO	1155072	next fit LIFO split-7	3407872
first fit AO no footer	1175552	next fit LIFO WPH	3371008
first fit FIFO	1220608	simple segregated 2^N	1579776
first fit FIFO no footer	1220608	simple segregated $3 * 2^N$	1505536
first fit LIFO	3170304		

Table A.19: Memory used by each allocator for the Ghostscript program, accounting for all overheads

Allocator Name	Memory	Allocator Name	Memory
binary buddy	203295	first fit LIFO def LIFO	413696
best fit AO	151552	first fit LIFO no footer	241664
best fit AO 8K	150528	first fit LIFO split-14	266240
best fit AO def AO	155648	first fit LIFO split-7	249856
best fit AO def FIFO	159744	half fit	159744
best fit AO def LIFO	155648	Lea 2.5.1	184320
best fit AO no footer	151552	Lea 2.5.1 no footer	184320
best fit FIFO	151552	Lea 2.6.1	151552
best fit FIFO no footer	151552	multi-fit max	163840
best fit LIFO	151552	multi-fit min	159744
best fit LIFO def AO	155648	next fit AO	188416
best fit LIFO def FIFO	155648	next fit AO 8K	168448
best fit LIFO def LIFO	155648	next fit AO def AO	303104
best fit LIFO no footer	151552	next fit AO def FIFO	323584
best fit LIFO split-14	155648	next fit AO def LIFO	307200
best fit LIFO split-7	151552	next fit AO no footer	188416
double buddy 10K	166815	next fit FIFO	253952
double buddy 5K	166815	next fit FIFO no footer	253952
first fit AO	151552	next fit LIFO	225280
first fit AO 8K	150016	next fit LIFO def LIFO	376832
first fit AO def AO	155648	next fit LIFO no footer	225280
first fit AO def FIFO	155648	next fit LIFO split-14	241664
first fit AO def LIFO	155648	next fit LIFO split-7	233472
first fit AO no footer	151552	next fit LIFO WPH	196608
first fit FIFO	155648	simple segregated 2^N	233728
first fit FIFO no footer	155648	simple segregated $3 * 2^N$	209408
first fit LIFO	241664		

Table A.20: Memory used by each allocator for the Grobner program, accounting for all overheads

Allocator Name	Memory	Allocator Name	Memory
binary buddy	4194335	first fit LIFO deferred LIFO	2101248
best fit AO	2101248	first fit LIFO no footer	2101248
best fit AO 8K	2098176	first fit LIFO split-14	2113536
best fit AO deferred AO	2101248	first fit LIFO split-7	2113536
best fit AO deferred FIFO	2101248	half fit	2101248
best fit AO deferred LIFO	2101248	Lea 2.5.1	2101248
best fit AO no footer	2101248	Lea 2.5.1 no footer	2101248
best fit FIFO	2101248	Lea 2.6.1	2101248
best fit FIFO no footer	2101248	multi-fit max	2101248
best fit LIFO	2101248	multi-fit min	2101248
best fit LIFO deferred AO	2101248	next fit AO	2101248
best fit LIFO deferred FIFO	2101248	next fit AO 8K	2099200
best fit LIFO deferred LIFO	2101248	next fit AO deferred AO	2101248
best fit LIFO no footer	2101248	next fit AO deferred FIFO	2101248
best fit LIFO split-14	2113536	next fit AO deferred LIFO	2101248
best fit LIFO split-7	2113536	next fit AO no footer	2101248
double buddy 10K	3146399	next fit FIFO	2101248
double buddy 5K	3146079	next fit FIFO no footer	2101248
first fit AO	2101248	next fit LIFO	2101248
first fit AO 8K	2098176	next fit LIFO deferred LIFO	2101248
first fit AO deferred AO	2101248	next fit LIFO no footer	2101248
first fit AO deferred FIFO	2101248	next fit LIFO split-14	2113536
first fit AO deferred LIFO	2101248	next fit LIFO split-7	2113536
first fit AO no footer	2101248	next fit LIFO WPH	2101248
first fit FIFO	2101248	simple segregated 2^N	2642688
first fit FIFO no footer	2101248	simple segregated $3 * 2^N$	2642688
first fit LIFO	2101248		

Table A.21: Memory used by each allocator for the Hyper program, accounting for all overheads

Allocator Name	Memory	Allocator Name	Memory
binary buddy	623647	first fit LIFO deferred LIFO	425984
best fit AO	409600	first fit LIFO no footer	421888
best fit AO 8K	406528	first fit LIFO split-14	421888
best fit AO deferred AO	409600	first fit LIFO split-7	421888
best fit AO deferred FIFO	409600	half fit	409600
best fit AO deferred LIFO	409600	Lea 2.5.1	409600
best fit AO no footer	409600	Lea 2.5.1 no footer	409600
best fit FIFO	409600	Lea 2.6.1	409600
best fit FIFO no footer	409600	multi-fit max	409600
best fit LIFO	409600	multi-fit min	409600
best fit LIFO deferred AO	409600	next fit AO	434176
best fit LIFO deferred FIFO	409600	next fit AO 8K	431104
best fit LIFO deferred LIFO	409600	next fit AO deferred AO	425984
best fit LIFO no footer	409600	next fit AO deferred FIFO	425984
best fit LIFO split-14	409600	next fit AO deferred LIFO	434176
best fit LIFO split-7	409600	next fit AO no footer	434176
double buddy 10K	533279	next fit FIFO	442368
double buddy 5K	532959	next fit FIFO no footer	442368
first fit AO	409600	next fit LIFO	462848
first fit AO 8K	407040	next fit LIFO deferred LIFO	442368
first fit AO deferred AO	409600	next fit LIFO no footer	462848
first fit AO deferred FIFO	409600	next fit LIFO split-14	458752
first fit AO deferred LIFO	409600	next fit LIFO split-7	462848
first fit AO no footer	409600	next fit LIFO WPH	434176
first fit FIFO	409600	simple segregated 2^N	702208
first fit FIFO no footer	409600	simple segregated $3 * 2^N$	628480
first fit LIFO	421888		

Table A.22: Memory used by each allocator for the P2C program, accounting for all overheads

Allocator Name	Memory	Allocator Name	Memory
binary buddy	98335	first fit LIFO deferred LIFO	77824
best fit AO	77824	first fit LIFO no footer	77824
best fit AO 8K	71168	first fit LIFO split-14	77824
best fit AO deferred AO	77824	first fit LIFO split-7	77824
best fit AO deferred FIFO	77824	half fit	77824
best fit AO deferred LIFO	77824	Lea 2.5.1	77824
best fit AO no footer	77824	Lea 2.5.1 no footer	77824
best fit FIFO	77824	Lea 2.6.1	77824
best fit FIFO no footer	77824	multi-fit max	77824
best fit LIFO	77824	multi-fit min	77824
best fit LIFO deferred AO	77824	next fit AO	77824
best fit LIFO deferred FIFO	77824	next fit AO 8K	73216
best fit LIFO deferred LIFO	77824	next fit AO deferred AO	77824
best fit LIFO no footer	77824	next fit AO deferred FIFO	77824
best fit LIFO split-14	77824	next fit AO deferred LIFO	77824
best fit LIFO split-7	77824	next fit AO no footer	77824
double buddy 10K	88351	next fit FIFO	77824
double buddy 5K	88351	next fit FIFO no footer	77824
first fit AO	77824	next fit LIFO	77824
first fit AO 8K	71168	next fit LIFO deferred LIFO	77824
first fit AO deferred AO	77824	next fit LIFO no footer	77824
first fit AO deferred FIFO	77824	next fit LIFO split-14	77824
first fit AO deferred LIFO	77824	next fit LIFO split-7	77824
first fit AO no footer	77824	next fit LIFO WPH	77824
first fit FIFO	77824	simple segregated 2^N	107008
first fit FIFO no footer	77824	simple segregated $3 * 2^N$	94720
first fit LIFO	77824		

Table A.23: Memory used by each allocator for the Perl program, accounting for all overheads

Allocator Name	Memory	Allocator Name	Memory
binary buddy	2512415	first fit LIFO deferred LIFO	1417216
best fit AO	1417216	first fit LIFO no footer	1417216
best fit AO 8K	1414656	first fit LIFO split-14	1417216
best fit AO deferred AO	1417216	first fit LIFO split-7	1417216
best fit AO deferred FIFO	1417216	half fit	1417216
best fit AO deferred LIFO	1417216	Lea 2.5.1	1417216
best fit AO no footer	1417216	Lea 2.5.1 no footer	1417216
best fit FIFO	1417216	Lea 2.6.1	1417216
best fit FIFO no footer	1417216	multi-fit max	1417216
best fit LIFO	1417216	multi-fit min	1417216
best fit LIFO deferred AO	1417216	next fit AO	1417216
best fit LIFO deferred FIFO	1417216	next fit AO 8K	1414656
best fit LIFO deferred LIFO	1417216	next fit AO deferred AO	1417216
best fit LIFO no footer	1417216	next fit AO deferred FIFO	1417216
best fit LIFO split-14	1417216	next fit AO deferred LIFO	1417216
best fit LIFO split-7	1417216	next fit AO no footer	1417216
double buddy 10K	1889183	next fit FIFO	1417216
double buddy 5K	1889311	next fit FIFO no footer	1417216
first fit AO	1417216	next fit LIFO	1417216
first fit AO 8K	1414656	next fit LIFO deferred LIFO	1417216
first fit AO deferred AO	1417216	next fit LIFO no footer	1417216
first fit AO deferred FIFO	1417216	next fit LIFO split-14	1417216
first fit AO deferred LIFO	1417216	next fit LIFO split-7	1417216
first fit AO no footer	1417216	next fit LIFO WPH	1417216
first fit FIFO	1417216	simple segregated 2^N	2530048
first fit FIFO no footer	1417216	simple segregated $3 * 2^N$	2024704
first fit LIFO	1417216		

Table A.24: Memory used by each allocator for the LRUsim program, accounting for all overheads

Allocator Name	% frag	Allocator Name	% frag
binary buddy	34.17%	first fit LIFO deferred LIFO	11.71%
best fit AO	0.33%	first fit LIFO no footer	23.77%
best fit AO 8K	0.33%	first fit LIFO split-14	18.26%
best fit AO deferred AO	11.53%	first fit LIFO split-7	18.26%
best fit AO deferred FIFO	17.22%	half fit	17.40%
best fit AO deferred LIFO	17.40%	Lea 2.5.1	23.08%
best fit AO no footer	0.33%	Lea 2.5.1 no footer	23.08%
best fit FIFO	0.33%	Lea 2.6.1	0.33%
best fit FIFO no footer	0.33%	multi-fit max	17.40%
best fit LIFO	0.50%	multi-fit min	17.40%
best fit LIFO deferred AO	11.53%	next fit AO	0.67%
best fit LIFO deferred FIFO	17.22%	next fit AO 8K	0.59%
best fit LIFO deferred LIFO	17.40%	next fit AO deferred AO	6.19%
best fit LIFO no footer	0.50%	next fit AO deferred FIFO	21.36%
best fit LIFO split-14	1.19%	next fit AO deferred LIFO	12.57%
best fit LIFO split-7	1.19%	next fit AO no footer	0.67%
double buddy 10K	31.35%	next fit FIFO	0.85%
double buddy 5K	31.34%	next fit FIFO no footer	0.85%
first fit AO	0.50%	next fit LIFO	21.02%
first fit AO 8K	0.35%	next fit LIFO deferred LIFO	15.15%
first fit AO deferred AO	6.02%	next fit LIFO no footer	21.02%
first fit AO deferred FIFO	11.71%	next fit LIFO split-14	18.60%
first fit AO deferred LIFO	6.02%	next fit LIFO split-7	18.60%
first fit AO no footer	0.50%	next fit LIFO WPH	17.57%
first fit FIFO	0.50%	simple segregated 2^N	99.47%
first fit FIFO no footer	0.50%	simple segregated $3 * 2^N$	99.89%
first fit LIFO	23.77%		

Table A.25: Percent fragmentation for each allocator for the GCC program, accounting for all overheads

A.4 Percent Actual Fragmentation for Each Allocator for Each Trace – All Overheads Removed

In this section, we present the percentage of actual fragmentation for each of the allocators for each of the programs. All implementation overheads have been removed from these results. Percentage actual fragmentation is computed as described in Section 2.9.

Allocator Name	% frag	Allocator Name	% frag
binary buddy	45.84%	first fit LIFO def LIFO	9.37%
best fit AO	0.26%	first fit LIFO no footer	9.37%
best fit AO 8K	0.26%	first fit LIFO split-14	10.89%
best fit AO def AO	0.26%	first fit LIFO split-7	10.89%
best fit AO def FIFO	0.26%	half fit	9.37%
best fit AO def LIFO	1.77%	Lea 2.5.1	10.89%
best fit AO no footer	0.26%	Lea 2.5.1 no footer	10.89%
best fit FIFO	0.26%	Lea 2.6.1	0.26%
best fit FIFO no footer	0.26%	multi-fit max	0.26%
best fit LIFO	0.26%	multi-fit min	10.89%
best fit LIFO def AO	1.77%	next fit AO	1.77%
best fit LIFO def FIFO	1.77%	next fit AO 8K	1.02%
best fit LIFO def LIFO	0.26%	next fit AO def AO	3.29%
best fit LIFO no footer	0.26%	next fit AO def FIFO	9.37%
best fit LIFO split-14	1.77%	next fit AO def LIFO	15.45%
best fit LIFO split-7	0.26%	next fit AO no footer	1.77%
double buddy 10K	68.72%	next fit FIFO	0.26%
double buddy 5K	68.67%	next fit FIFO no footer	0.26%
first fit AO	0.26%	next fit LIFO	9.37%
first fit AO 8K	0.26%	next fit LIFO def LIFO	0.26%
first fit AO def AO	0.26%	next fit LIFO no footer	9.37%
first fit AO def FIFO	0.26%	next fit LIFO split-14	9.37%
first fit AO def LIFO	0.26%	next fit LIFO split-7	10.89%
first fit AO no footer	0.26%	next fit LIFO WPH	12.41%
first fit FIFO	0.26%	simple segregated 2^N	162.41%
first fit FIFO no footer	0.26%	simple segregated $3 * 2^N$	159.47%
first fit LIFO	9.37%		

Table A.26: Percent fragmentation for each allocator for the Espresso program, accounting for all overheads

Allocator Name	% frag	Allocator Name	% frag
binary buddy	38.35%	first fit LIFO def LIFO	44.47%
best fit AO	3.40%	first fit LIFO no footer	178.86%
best fit AO 8K	3.00%	first fit LIFO split-14	180.66%
best fit AO def AO	1.60%	first fit LIFO split-7	179.58%
best fit AO def FIFO	2.32%	half fit	1.60%
best fit AO def LIFO	1.60%	Lea 2.5.1	84.82%
best fit AO no footer	3.40%	Lea 2.5.1 no footer	84.82%
best fit FIFO	3.04%	Lea 2.6.1	3.40%
best fit FIFO no footer	3.04%	multi-fit max	3.04%
best fit LIFO	3.40%	multi-fit min	3.04%
best fit LIFO def AO	1.60%	next fit AO	16.73%
best fit LIFO def FIFO	1.60%	next fit AO 8K	18.67%
best fit LIFO def LIFO	1.60%	next fit AO def AO	3.04%
best fit LIFO no footer	3.40%	next fit AO def FIFO	3.40%
best fit LIFO split-14	3.76%	next fit AO def LIFO	3.04%
best fit LIFO split-7	3.04%	next fit AO no footer	16.73%
double buddy 10K	20.76%	next fit FIFO	54.56%
double buddy 5K	20.78%	next fit FIFO no footer	54.56%
first fit AO	3.40%	next fit LIFO	200.11%
first fit AO 8K	2.77%	next fit LIFO def LIFO	49.16%
first fit AO def AO	1.60%	next fit LIFO no footer	200.11%
first fit AO def FIFO	2.32%	next fit LIFO split-14	199.39%
first fit AO def LIFO	1.60%	next fit LIFO split-7	199.75%
first fit AO no footer	3.40%	next fit LIFO WPH	196.51%
first fit FIFO	7.36%	simple segregated 2^N	38.96%
first fit FIFO no footer	7.36%	simple segregated $3 * 2^N$	32.43%
first fit LIFO	178.86%		

Table A.27: Percent fragmentation for each allocator for the Ghostscript program, accounting for all overheads

Allocator Name	% frag	Allocator Name	% frag
binary buddy	36.86%	first fit LIFO def LIFO	178.51%
best fit AO	2.03%	first fit LIFO no footer	62.70%
best fit AO 8K	1.34%	first fit LIFO split-14	79.24%
best fit AO def AO	4.79%	first fit LIFO split-7	68.21%
best fit AO def FIFO	7.54%	half fit	7.54%
best fit AO def LIFO	4.79%	Lea 2.5.1	24.09%
best fit AO no footer	2.03%	Lea 2.5.1 no footer	24.09%
best fit FIFO	2.03%	Lea 2.6.1	2.03%
best fit FIFO no footer	2.03%	multi-fit max	10.30%
best fit LIFO	2.03%	multi-fit min	7.54%
best fit LIFO def AO	4.79%	next fit AO	26.85%
best fit LIFO def FIFO	4.79%	next fit AO 8K	13.40%
best fit LIFO def LIFO	4.79%	next fit AO def AO	104.06%
best fit LIFO no footer	2.03%	next fit AO def FIFO	117.85%
best fit LIFO split-14	4.79%	next fit AO def LIFO	106.82%
best fit LIFO split-7	2.03%	next fit AO no footer	26.85%
double buddy 10K	12.31%	next fit FIFO	70.97%
double buddy 5K	12.31%	next fit FIFO no footer	70.97%
first fit AO	2.03%	next fit LIFO	51.67%
first fit AO 8K	1.00%	next fit LIFO def LIFO	153.70%
first fit AO def AO	4.79%	next fit LIFO no footer	51.67%
first fit AO def FIFO	4.79%	next fit LIFO split-14	62.70%
first fit AO def LIFO	4.79%	next fit LIFO split-7	57.18%
first fit AO no footer	2.03%	next fit LIFO WPH	32.36%
first fit FIFO	4.79%	simple segregated 2^N	57.35%
first fit FIFO no footer	4.79%	simple segregated $3 * 2^N$	40.98%
first fit LIFO	62.70%		

Table A.28: Percent fragmentation for each allocator for the Grobner program, accounting for all overheads

Allocator Name	% frag	Allocator Name	% frag
binary buddy	99.92%	first fit LIFO deferred LIFO	0.16%
best fit AO	0.16%	first fit LIFO no footer	0.16%
best fit AO 8K	0.01%	first fit LIFO split-14	0.74%
best fit AO deferred AO	0.16%	first fit LIFO split-7	0.74%
best fit AO deferred FIFO	0.16%	half fit	0.16%
best fit AO deferred LIFO	0.16%	Lea 2.5.1	0.16%
best fit AO no footer	0.16%	Lea 2.5.1 no footer	0.16%
best fit FIFO	0.16%	Lea 2.6.1	0.16%
best fit FIFO no footer	0.16%	multi-fit max	0.16%
best fit LIFO	0.16%	multi-fit min	0.16%
best fit LIFO deferred AO	0.16%	next fit AO	0.16%
best fit LIFO deferred FIFO	0.16%	next fit AO 8K	0.06%
best fit LIFO deferred LIFO	0.16%	next fit AO deferred AO	0.16%
best fit LIFO no footer	0.16%	next fit AO deferred FIFO	0.16%
best fit LIFO split-14	0.74%	next fit AO deferred LIFO	0.16%
best fit LIFO split-7	0.74%	next fit AO no footer	0.16%
double buddy 10K	49.97%	next fit FIFO	0.16%
double buddy 5K	49.96%	next fit FIFO no footer	0.16%
first fit AO	0.16%	next fit LIFO	0.16%
first fit AO 8K	0.01%	next fit LIFO deferred LIFO	0.16%
first fit AO deferred AO	0.16%	next fit LIFO no footer	0.16%
first fit AO deferred FIFO	0.16%	next fit LIFO split-14	0.74%
first fit AO deferred LIFO	0.16%	next fit LIFO split-7	0.74%
first fit AO no footer	0.16%	next fit LIFO WPH	0.16%
first fit FIFO	0.16%	simple segregated 2^N	25.96%
first fit FIFO no footer	0.16%	simple segregated $3 * 2^N$	25.96%
first fit LIFO	0.16%		

Table A.29: Percent fragmentation for each allocator for the Hyper program, accounting for all overheads

Allocator Name	% frag	Allocator Name	% frag
binary buddy	54.97%	first fit LIFO deferred LIFO	5.85%
best fit AO	1.78%	first fit LIFO no footer	4.83%
best fit AO 8K	1.02%	first fit LIFO split-14	4.83%
best fit AO deferred AO	1.78%	first fit LIFO split-7	4.83%
best fit AO deferred FIFO	1.78%	half fit	1.78%
best fit AO deferred LIFO	1.78%	Lea 2.5.1	1.78%
best fit AO no footer	1.78%	Lea 2.5.1 no footer	1.78%
best fit FIFO	1.78%	Lea 2.6.1	1.78%
best fit FIFO no footer	1.78%	multi-fit max	1.78%
best fit LIFO	1.78%	multi-fit min	1.78%
best fit LIFO deferred AO	1.78%	next fit AO	7.89%
best fit LIFO deferred FIFO	1.78%	next fit AO 8K	7.12%
best fit LIFO deferred LIFO	1.78%	next fit AO deferred AO	5.85%
best fit LIFO no footer	1.78%	next fit AO deferred FIFO	5.85%
best fit LIFO split-14	1.78%	next fit AO deferred LIFO	7.89%
best fit LIFO split-7	1.78%	next fit AO no footer	7.89%
double buddy 10K	32.51%	next fit FIFO	9.92%
double buddy 5K	32.43%	next fit FIFO no footer	9.92%
first fit AO	1.78%	next fit LIFO	15.01%
first fit AO 8K	1.15%	next fit LIFO deferred LIFO	9.92%
first fit AO deferred AO	1.78%	next fit LIFO no footer	15.01%
first fit AO deferred FIFO	1.78%	next fit LIFO split-14	13.99%
first fit AO deferred LIFO	1.78%	next fit LIFO split-7	15.01%
first fit AO no footer	1.78%	next fit LIFO WPH	7.89%
first fit FIFO	1.78%	simple segregated 2^N	74.49%
first fit FIFO no footer	1.78%	simple segregated $3 * 2^N$	56.17%
first fit LIFO	4.83%		

Table A.30: Percent fragmentation for each allocator for the P2C program, accounting for all overheads

Allocator Name	% frag	Allocator Name	% frag
binary buddy	38.97%	first fit LIFO deferred LIFO	9.98%
best fit AO	9.98%	first fit LIFO no footer	9.98%
best fit AO 8K	0.58%	first fit LIFO split-14	9.98%
best fit AO deferred AO	9.98%	first fit LIFO split-7	9.98%
best fit AO deferred FIFO	9.98%	half fit	9.98%
best fit AO deferred LIFO	9.98%	Lea 2.5.1	9.98%
best fit AO no footer	9.98%	Lea 2.5.1 no footer	9.98%
best fit FIFO	9.98%	Lea 2.6.1	9.98%
best fit FIFO no footer	9.98%	multi-fit max	9.98%
best fit LIFO	9.98%	multi-fit min	9.98%
best fit LIFO deferred AO	9.98%	next fit AO	9.98%
best fit LIFO deferred FIFO	9.98%	next fit AO 8K	3.47%
best fit LIFO deferred LIFO	9.98%	next fit AO deferred AO	9.98%
best fit LIFO no footer	9.98%	next fit AO deferred FIFO	9.98%
best fit LIFO split-14	9.98%	next fit AO deferred LIFO	9.98%
best fit LIFO split-7	9.98%	next fit AO no footer	9.98%
double buddy 10K	24.86%	next fit FIFO	9.98%
double buddy 5K	24.86%	next fit FIFO no footer	9.98%
first fit AO	9.98%	next fit LIFO	9.98%
first fit AO 8K	0.58%	next fit LIFO deferred LIFO	9.98%
first fit AO deferred AO	9.98%	next fit LIFO no footer	9.98%
first fit AO deferred FIFO	9.98%	next fit LIFO split-14	9.98%
first fit AO deferred LIFO	9.98%	next fit LIFO split-7	9.98%
first fit AO no footer	9.98%	next fit LIFO WPH	9.98%
first fit FIFO	9.98%	simple segregated 2^N	51.22%
first fit FIFO no footer	9.98%	simple segregated $3 * 2^N$	33.86%
first fit LIFO	9.98%		

Table A.31: Percent fragmentation for each allocator for the Perl program, accounting for all overheads

Allocator Name	% frag	Allocator Name	% frag
binary buddy	77.74%	first fit LIFO deferred LIFO	0.26%
best fit AO	0.26%	first fit LIFO no footer	0.26%
best fit AO 8K	0.08%	first fit LIFO split-14	0.26%
best fit AO deferred AO	0.26%	first fit LIFO split-7	0.26%
best fit AO deferred FIFO	0.26%	half fit	0.26%
best fit AO deferred LIFO	0.26%	Lea 2.5.1	0.26%
best fit AO no footer	0.26%	Lea 2.5.1 no footer	0.26%
best fit FIFO	0.26%	Lea 2.6.1	0.26%
best fit FIFO no footer	0.26%	multi-fit max	0.26%
best fit LIFO	0.26%	multi-fit min	0.26%
best fit LIFO deferred AO	0.26%	next fit AO	0.26%
best fit LIFO deferred FIFO	0.26%	next fit AO 8K	0.08%
best fit LIFO deferred LIFO	0.26%	next fit AO deferred AO	0.26%
best fit LIFO no footer	0.26%	next fit AO deferred FIFO	0.26%
best fit LIFO split-14	0.26%	next fit AO deferred LIFO	0.26%
best fit LIFO split-7	0.26%	next fit AO no footer	0.26%
double buddy 10K	33.65%	next fit FIFO	0.26%
double buddy 5K	33.66%	next fit FIFO no footer	0.26%
first fit AO	0.26%	next fit LIFO	0.26%
first fit AO 8K	0.08%	next fit LIFO deferred LIFO	0.26%
first fit AO deferred AO	0.26%	next fit LIFO no footer	0.26%
first fit AO deferred FIFO	0.26%	next fit LIFO split-14	0.26%
first fit AO deferred LIFO	0.26%	next fit LIFO split-7	0.26%
first fit AO no footer	0.26%	next fit LIFO WPH	0.26%
first fit FIFO	0.26%	simple segregated 2^N	78.98%
first fit FIFO no footer	0.26%	simple segregated $3 * 2^N$	43.23%
first fit LIFO	0.26%		

Table A.32: Percent fragmentation for each allocator for the LRUsim program, accounting for all overheads

Appendix B

Locality Results for All Allocators

In this appendix, we present the locality results for each trace we studied. We present this data in two sections. In the first section, we present the number of 4K pages necessary to achieve 10%, 50%, and 90% CPU utilization, given a 100 MIP machine and a 10 millisecond disk access time. In the second section, we present the cache miss rates for 16K, 64K, and 256K data caches. The two caches studied are 8-way set associative and fully associative.

B.1 Number of 4K Pages Necessary to Achieve Given Percentage of CPU Time

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
binary buddy	44	66	84	44	66	118
best fit AO	38	56	75	38	57	81
best fit AO 8K	38	56	74	38	57	81
best fit AO deferred AO	49	63	75	49	63	100
best fit AO deferred FIFO	72	76	76	72	76	95
best fit AO deferred LIFO	68	72	76	68	72	83
best fit AO no footer	34	49	66	34	50	80
best fit FIFO	39	56	75	39	57	82
best fit FIFO no footer	36	50	66	36	50	78
best fit LIFO	39	57	75	39	57	82
best fit LIFO deferred AO	52	64	76	52	64	99
best fit LIFO deferred FIFO	73	77	77	73	77	86
best fit LIFO deferred LIFO	69	72	77	69	73	94
best fit LIFO no footer	35	50	66	35	51	75
best fit LIFO split-14	38	56	75	38	57	81
best fit LIFO split-7	39	56	75	39	57	81
double buddy 10K	44	66	81	45	66	115
double buddy 5K	45	65	81	45	65	114
first fit AO	38	55	74	38	56	81
first fit AO 8K	38	57	76	38	58	83
first fit AO deferred AO	46	63	75	46	63	92
first fit AO deferred FIFO	67	75	81	67	76	93
first fit AO deferred LIFO	68	73	78	68	74	85
first fit AO no footer	35	50	68	35	51	80
first fit FIFO	44	66	77	44	67	90
first fit FIFO no footer	42	62	69	43	62	86
first fit LIFO	38	58	74	38	59	97

Table B.1: Number of 4K pages necessary to achieve given percentage of CPU time for Espresso (Part 1)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
first fit LIFO deferred LIFO	65	73	77	65	73	101
first fit LIFO no footer	36	52	68	36	53	85
first fit LIFO split-14	38	57	75	38	58	96
first fit LIFO split-7	38	57	74	38	58	90
half fit	67	72	75	67	72	83
Lea 2.5.1	61	72	81	61	72	98
Lea 2.5.1 no footer	54	64	72	54	65	84
Lea 2.6.1	35	51	67	35	51	75
multi-fit max	64	71	75	64	71	84
multi-fit min	68	72	75	68	72	90
next fit AO	41	59	75	41	59	96
next fit AO 8K	40	57	76	40	58	86
next fit AO deferred AO	48	64	76	48	65	98
next fit AO deferred FIFO	65	74	81	65	74	96
next fit AO deferred LIFO	65	73	78	65	73	96
next fit AO no footer	41	55	71	41	56	79
next fit FIFO	41	62	75	41	63	82
next fit FIFO no footer	38	56	69	38	57	78
next fit LIFO	39	58	75	39	59	100
next fit LIFO deferred LIFO	63	71	77	63	71	92
next fit LIFO no footer	36	54	68	36	55	87
next fit LIFO split-14	38	56	74	38	57	96
next fit LIFO split-7	38	57	75	38	58	94
next fit LIFO WPH	38	57	75	38	58	95
simple segregated 2^N	98	108	118	98	108	247
simple segregated $3 * 2^N$	85	93	113	85	94	249

Table B.2: Number of 4K pages necessary to achieve given percentage of CPU time for Espresso (Part 2)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
binary buddy	142	397	438	148	516	516
best fit AO	286	302	339	286	420	420
best fit AO 8K	281	299	338	282	423	423
best fit AO deferred AO	270	289	338	270	418	418
best fit AO deferred FIFO	272	291	338	272	420	420
best fit AO deferred LIFO	270	293	337	271	421	421
best fit AO no footer	279	295	328	280	409	409
best fit FIFO	289	305	338	290	422	422
best fit FIFO no footer	278	293	327	279	412	412
best fit LIFO	291	306	340	292	422	422
best fit LIFO deferred AO	272	290	338	272	421	421
best fit LIFO deferred FIFO	270	293	338	271	417	417
best fit LIFO deferred LIFO	278	296	335	279	421	421
best fit LIFO no footer	281	297	327	282	411	411
best fit LIFO split-14	279	296	340	280	423	423
best fit LIFO split-7	285	298	341	285	421	421
double buddy 10K	132	318	374	137	455	455
double buddy 5K	133	320	376	139	456	456
first fit AO	288	302	339	289	422	422
first fit AO 8K	288	303	340	289	423	423
first fit AO deferred AO	283	300	337	284	419	419
first fit AO deferred FIFO	271	292	337	272	418	418
first fit AO deferred LIFO	275	295	338	276	419	419
first fit AO no footer	282	296	323	283	412	412
first fit FIFO	309	321	347	309	438	438
first fit FIFO no footer	295	309	333	295	421	421
first fit LIFO	241	878	901	253	981	981

Table B.3: Number of 4K pages necessary to achieve given percentage of CPU time for Ghostscript (Part 1)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
first fit LIFO deferred LIFO	262	398	440	265	519	519
first fit LIFO no footer	229	836	863	241	944	944
first fit LIFO split-14	243	874	898	255	978	978
first fit LIFO split-7	239	884	910	250	988	988
half fit	270	290	338	271	418	418
Lea 2.5.1	199	356	438	206	521	521
Lea 2.5.1 no footer	192	329	414	198	484	484
Lea 2.6.1	109	267	330	113	402	402
multi-fit max	283	298	335	283	420	420
multi-fit min	279	294	336	279	419	419
next fit AO	348	362	376	349	466	466
next fit AO 8K	365	378	394	366	487	487
next fit AO deferred AO	289	305	333	290	424	424
next fit AO deferred FIFO	299	315	336	299	430	430
next fit AO deferred LIFO	292	307	335	293	424	424
next fit AO no footer	336	348	371	337	463	463
next fit FIFO	298	414	468	300	553	553
next fit FIFO no footer	248	408	462	250	543	543
next fit LIFO	223	936	962	259	1045	1045
next fit LIFO deferred LIFO	222	474	509	227	589	589
next fit LIFO no footer	190	872	900	214	982	982
next fit LIFO split-14	233	942	966	276	1050	1050
next fit LIFO split-7	228	944	966	269	1050	1050
next fit LIFO WPH	333	933	954	403	1037	1037
simple segregated 2^N	130	418	455	136	527	527
simple segregated $3 * 2^N$	133	346	403	138	485	485

Table B.4: Number of 4K pages necessary to achieve given percentage of CPU time for Ghostscript (Part 2)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
binary buddy	53	70	101	54	115	115
best fit AO	55	71	110	55	123	123
best fit AO 8K	54	69	110	55	124	124
best fit AO deferred AO	53	68	108	53	120	120
best fit AO deferred FIFO	53	66	108	54	123	123
best fit AO deferred LIFO	55	69	108	56	122	122
best fit AO no footer	49	65	102	50	113	113
best fit FIFO	55	70	108	55	124	124
best fit FIFO no footer	51	66	100	52	114	114
best fit LIFO	55	72	110	56	123	123
best fit LIFO deferred AO	52	65	106	52	123	123
best fit LIFO deferred FIFO	55	68	108	56	123	123
best fit LIFO deferred LIFO	56	70	108	57	124	124
best fit LIFO no footer	49	65	99	50	113	113
best fit LIFO split-14	54	69	109	55	123	123
best fit LIFO split-7	57	72	109	58	124	124
double buddy 10K	50	65	101	51	115	115
double buddy 5K	50	65	101	51	114	114
first fit AO	51	67	108	52	124	124
first fit AO 8K	51	67	109	52	124	124
first fit AO deferred AO	52	67	107	52	122	122
first fit AO deferred FIFO	56	71	107	57	123	123
first fit AO deferred LIFO	54	69	110	55	122	122
first fit AO no footer	47	62	100	47	113	113
first fit FIFO	64	77	109	65	124	124
first fit FIFO no footer	54	66	100	54	113	113
first fit LIFO	90	95	132	91	145	145

Table B.5: Number of 4K pages necessary to achieve given percentage of CPU time for Grobner (Part 1)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
first fit LIFO deferred LIFO	98	107	159	98	171	171
first fit LIFO no footer	76	83	123	78	135	135
first fit LIFO split-14	91	95	131	92	144	144
first fit LIFO split-7	79	86	128	80	139	139
half fit	57	68	107	57	123	123
Lea 2.5.1	63	80	109	64	126	126
Lea 2.5.1 no footer	58	74	107	58	117	117
Lea 2.6.1	47	63	101	48	115	115
multi-fit max	84	98	115	85	126	126
multi-fit min	82	95	112	83	125	125
next fit AO	81	99	117	82	129	129
next fit AO 8K	83	99	119	84	130	130
next fit AO deferred AO	81	98	119	81	132	132
next fit AO deferred FIFO	95	111	132	95	143	143
next fit AO deferred LIFO	94	108	129	94	143	143
next fit AO no footer	73	87	106	74	120	120
next fit FIFO	81	94	117	81	130	130
next fit FIFO no footer	72	85	106	72	121	121
next fit LIFO	79	90	125	80	138	138
next fit LIFO deferred LIFO	93	112	150	94	162	162
next fit LIFO no footer	72	88	116	72	130	130
next fit LIFO split-14	70	88	123	71	138	138
next fit LIFO split-7	71	88	122	72	137	137
next fit LIFO WPH	80	90	116	80	127	127
simple segregated 2^N	44	74	128	46	145	145
simple segregated $3 * 2^N$	43	60	117	44	134	134

Table B.6: Number of 4K pages necessary to achieve given percentage of CPU time for Grobner (Part 2)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
binary buddy	123	127	143	123	127	573
best fit AO	123	128	141	123	129	566
best fit AO 8K	123	128	141	123	129	566
best fit AO deferred AO	121	126	138	121	126	567
best fit AO deferred FIFO	122	127	138	122	127	569
best fit AO deferred LIFO	122	127	141	122	127	569
best fit AO no footer	122	127	141	122	127	566
best fit FIFO	122	128	140	122	129	570
best fit FIFO no footer	122	127	141	122	128	568
best fit LIFO	122	128	140	122	129	570
best fit LIFO deferred AO	121	126	137	121	126	569
best fit LIFO deferred FIFO	122	127	137	122	127	567
best fit LIFO deferred LIFO	122	127	142	122	127	567
best fit LIFO no footer	121	127	139	122	127	568
best fit LIFO split-14	123	129	140	123	130	573
best fit LIFO split-7	123	129	140	123	130	571
double buddy 10K	126	129	147	126	130	578
double buddy 5K	125	129	145	125	129	579
first fit AO	122	128	140	122	129	566
first fit AO 8K	122	128	142	122	129	566
first fit AO deferred AO	121	126	142	121	126	567
first fit AO deferred FIFO	122	127	142	122	127	569
first fit AO deferred LIFO	122	127	143	122	127	569
first fit AO no footer	122	127	141	122	127	566
first fit FIFO	123	129	141	123	129	570
first fit FIFO no footer	123	128	141	123	128	568
first fit LIFO	123	129	141	123	129	570

Table B.7: Number of 4K pages necessary to achieve given percentage of CPU time for Hyper (Part 1)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
first fit LIFO deferred LIFO	122	127	143	122	127	567
first fit LIFO no footer	122	128	140	122	128	568
first fit LIFO split-14	124	129	142	124	130	573
first fit LIFO split-7	124	129	142	124	130	571
half fit	122	127	142	122	127	569
Lea 2.5.1	122	126	142	122	126	565
Lea 2.5.1 no footer	122	127	141	122	127	569
Lea 2.6.1	122	126	142	122	126	565
multi-fit max	123	128	142	123	128	569
multi-fit min	123	128	142	123	128	569
next fit AO	123	129	141	123	129	566
next fit AO 8K	124	129	140	124	130	566
next fit AO deferred AO	122	127	139	122	127	567
next fit AO deferred FIFO	122	127	139	122	127	569
next fit AO deferred LIFO	122	127	140	122	127	569
next fit AO no footer	123	128	142	123	128	566
next fit FIFO	123	129	141	123	129	570
next fit FIFO no footer	123	128	141	123	128	568
next fit LIFO	123	129	142	123	129	570
next fit LIFO deferred LIFO	122	126	138	122	126	568
next fit LIFO no footer	123	128	141	123	128	568
next fit LIFO split-14	124	130	143	124	130	573
next fit LIFO split-7	124	130	143	124	130	571
next fit LIFO WPH	123	129	143	123	129	566
simple segregated 2^N	123	128	142	123	128	569
simple segregated $3 * 2^N$	123	129	142	123	129	571

Table B.8: Number of 4K pages necessary to achieve given percentage of CPU time for Hyper (Part 2)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
binary buddy	179	201	215	180	214	254
best fit AO	153	178	193	154	190	228
best fit AO 8K	152	177	193	153	191	229
best fit AO deferred AO	151	176	192	152	188	230
best fit AO deferred FIFO	155	176	192	156	189	230
best fit AO deferred LIFO	155	176	192	155	189	230
best fit AO no footer	142	165	179	143	175	214
best fit FIFO	152	178	192	154	191	228
best fit FIFO no footer	143	165	179	144	175	215
best fit LIFO	153	178	193	154	191	227
best fit LIFO deferred AO	148	175	192	150	188	230
best fit LIFO deferred FIFO	156	176	192	157	189	230
best fit LIFO deferred LIFO	154	176	192	155	188	230
best fit LIFO no footer	141	165	179	142	175	215
best fit LIFO split-14	153	178	192	154	191	228
best fit LIFO split-7	153	178	192	154	191	228
double buddy 10K	145	167	187	146	181	228
double buddy 5K	145	167	186	146	181	228
first fit AO	146	175	190	147	189	228
first fit AO 8K	146	175	190	146	189	229
first fit AO deferred AO	148	174	191	149	187	230
first fit AO deferred FIFO	154	176	191	155	189	231
first fit AO deferred LIFO	152	177	192	153	189	230
first fit AO no footer	136	162	178	137	174	215
first fit FIFO	158	178	192	158	189	227
first fit FIFO no footer	147	163	178	147	174	213
first fit LIFO	160	183	197	161	194	229

Table B.9: Number of 4K pages necessary to achieve given percentage of CPU time for P2C (Part 1)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
first fit LIFO deferred LIFO	157	180	193	157	189	230
first fit LIFO no footer	150	168	180	151	177	216
first fit LIFO split-14	161	184	197	162	194	231
first fit LIFO split-7	161	184	197	162	194	231
half fit	155	176	192	156	189	230
Lea 2.5.1	170	187	198	171	196	237
Lea 2.5.1 no footer	157	173	183	158	180	222
Lea 2.6.1	145	165	178	145	174	221
multi-fit max	165	180	192	166	188	230
multi-fit min	159	178	193	160	189	230
next fit AO	167	183	198	168	195	233
next fit AO 8K	166	184	199	167	196	235
next fit AO deferred AO	154	179	193	155	190	232
next fit AO deferred FIFO	158	181	195	160	193	234
next fit AO deferred LIFO	157	180	194	158	191	233
next fit AO no footer	153	168	182	154	177	221
next fit FIFO	170	186	201	171	198	237
next fit FIFO no footer	155	170	185	156	180	222
next fit LIFO	169	191	205	170	202	241
next fit LIFO deferred LIFO	159	183	196	160	194	235
next fit LIFO no footer	157	176	191	158	186	227
next fit LIFO split-14	170	192	205	171	202	241
next fit LIFO split-7	170	191	205	172	202	241
next fit LIFO WPH	164	184	198	165	194	234
simple segregated 2^N	184	223	246	186	281	294
simple segregated $3 * 2^N$	163	195	217	165	216	270

Table B.10: Number of 4K pages necessary to achieve given percentage of CPU time for P2C (Part 2)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
binary buddy	42	54	75	42	55	107
best fit AO	39	52	70	39	53	101
best fit AO 8K	39	53	69	39	54	102
best fit AO deferred AO	41	54	71	41	55	101
best fit AO deferred FIFO	41	54	72	41	55	102
best fit AO deferred LIFO	40	54	73	40	55	103
best fit AO no footer	38	52	68	38	52	100
best fit FIFO	39	53	69	39	54	102
best fit FIFO no footer	38	52	68	38	53	100
best fit LIFO	39	52	69	39	53	101
best fit LIFO deferred AO	41	53	71	41	54	102
best fit LIFO deferred FIFO	41	54	72	41	55	103
best fit LIFO deferred LIFO	40	54	72	40	55	102
best fit LIFO no footer	38	51	69	38	52	100
best fit LIFO split-14	39	53	70	39	54	100
best fit LIFO split-7	39	53	69	39	54	101
double buddy 10K	44	55	71	44	56	103
double buddy 5K	44	54	71	44	55	102
first fit AO	39	53	72	39	54	100
first fit AO 8K	39	53	73	39	55	100
first fit AO deferred AO	41	55	71	41	56	102
first fit AO deferred FIFO	40	55	71	41	56	101
first fit AO deferred LIFO	41	55	72	41	56	102
first fit AO no footer	38	52	71	38	54	100
first fit FIFO	41	53	72	41	55	102
first fit FIFO no footer	39	53	71	39	54	99
first fit LIFO	39	55	73	39	56	103

Table B.11: Number of 4K pages necessary to achieve given percentage of CPU time for Perl (Part 1)

	w/o compulsory			w/compulsory		
Allocator Name	10%	50%	90%	10%	50%	90%
first fit LIFO deferred LIFO	41	55	72	41	56	101
first fit LIFO no footer	39	52	71	39	53	99
first fit LIFO split-14	40	54	70	40	55	102
first fit LIFO split-7	39	54	72	39	55	103
half fit	41	54	74	42	55	102
Lea 2.5.1	41	57	73	41	58	102
Lea 2.5.1 no footer	40	55	71	40	56	102
Lea 2.6.1	39	54	68	39	55	99
multi-fit max	43	55	75	43	56	101
multi-fit min	44	55	75	44	56	101
next fit AO	44	55	72	44	56	100
next fit AO 8K	44	55	73	44	56	102
next fit AO deferred AO	44	57	72	44	58	102
next fit AO deferred FIFO	44	56	75	44	57	100
next fit AO deferred LIFO	44	56	75	44	57	101
next fit AO no footer	43	53	73	43	54	99
next fit FIFO	44	56	75	44	57	100
next fit FIFO no footer	41	54	71	41	55	99
next fit LIFO	42	55	74	42	56	101
next fit LIFO deferred LIFO	42	56	73	42	57	101
next fit LIFO no footer	39	54	73	39	55	99
next fit LIFO split-14	40	53	74	40	54	101
next fit LIFO split-7	42	55	74	42	56	100
next fit LIFO WPH	39	54	73	39	55	100
simple segregated 2^N	46	56	78	46	57	120
simple segregated $3 * 2^N$	47	65	80	47	66	117

Table B.12: Number of 4K pages necessary to achieve given percentage of CPU time for Perl (Part 2)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
binary buddy	2.85%	0.361%	.00500%	2.83%	0.261%	.0045%
best fit AO	2.99%	0.400%	.00345%	3.03%	0.363%	.0033%
best fit AO 8K	3.01%	0.380%	.00330%	3.03%	0.364%	.0032%
best fit AO def AO	3.02%	0.388%	.00397%	3.06%	0.392%	.0038%
best fit AO def FIFO	3.18%	0.607%	.00906%	3.19%	0.605%	.0040%
best fit AO def LIFO	3.10%	0.463%	.00363%	3.13%	0.434%	.0033%
best fit AO no-foot	2.90%	0.298%	.00339%	2.96%	0.294%	.0035%
best fit FIFO	2.97%	0.382%	.00335%	3.02%	0.369%	.0033%
best fit FIFO no-foot	2.92%	0.303%	.00330%	2.96%	0.295%	.0034%
best fit LIFO	2.99%	0.396%	.00342%	3.04%	0.366%	.0032%
best fit LIFO def AO	3.00%	0.391%	.00379%	3.04%	0.384%	.0036%
best fit LIFO def FIFO	3.20%	0.618%	.00500%	3.21%	0.605%	.0035%
best fit LIFO def LIFO	3.11%	0.461%	.00404%	3.13%	0.437%	.0038%
best fit LIFO no-foot	2.92%	0.337%	.00306%	2.95%	0.294%	.0031%
best fit LIFO split-14	2.95%	0.394%	.00345%	3.01%	0.365%	.0033%
best fit LIFO split-7	2.99%	0.383%	.00353%	3.03%	0.364%	.0032%
double buddy 10K	2.79%	0.318%	.00372%	2.83%	0.247%	.0035%
double buddy 5K	2.78%	0.291%	.00380%	2.82%	0.245%	.0034%
first fit AO	2.99%	0.369%	.00345%	3.03%	0.365%	.0032%
first fit AO 8K	2.98%	0.365%	.00328%	3.03%	0.365%	.0032%
first fit AO def AO	3.03%	0.398%	.00371%	3.06%	0.386%	.0033%
first fit AO def FIFO	3.16%	0.605%	.00475%	3.19%	0.601%	.0036%
first fit AO def LIFO	3.11%	0.470%	.00366%	3.13%	0.433%	.0034%
first fit AO no-foot	2.88%	0.341%	.00320%	2.94%	0.289%	.0033%
first fit FIFO	3.14%	0.511%	.00484%	3.17%	0.521%	.0036%
first fit FIFO no-foot	3.10%	0.466%	.00380%	3.12%	0.456%	.0035%
first fit LIFO	2.98%	0.366%	.00404%	3.03%	0.363%	.0038%

Table B.13: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for Espresso (Part 1)

B.2 Cache Miss Rate for Given Set-Associative Cache Size (32 Byte Line Size, 8-Way Set-Associative)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
first fit LIFO def LIFO	3.07%	0.445%	.00397%	3.09%	0.424%	.0039%
first fit LIFO no-foot	2.88%	0.299%	.00353%	2.94%	0.292%	.0036%
first fit LIFO split-14	2.97%	0.351%	.00404%	3.02%	0.361%	.0038%
first fit LIFO split-7	2.93%	0.376%	.00385%	3.00%	0.361%	.0035%
half fit	3.11%	0.450%	.00361%	3.14%	0.435%	.0033%
Lea 2.5.1	3.09%	0.503%	.00649%	3.12%	0.462%	.0051%
Lea 2.5.1 no-foot	3.02%	0.423%	.00336%	3.05%	0.386%	.0033%
Lea 2.6.1	2.90%	0.318%	.00299%	2.95%	0.292%	.0030%
multi-fit max	3.08%	0.445%	.00352%	3.12%	0.437%	.0033%
multi-fit min	3.11%	0.451%	.00375%	3.13%	0.437%	.0033%
next fit AO	3.14%	0.433%	.00391%	3.17%	0.442%	.0037%
next fit AO 8K	3.12%	0.459%	.00357%	3.16%	0.428%	.0033%
next fit AO def AO	3.09%	0.421%	.00392%	3.11%	0.414%	.0035%
next fit AO def FIFO	3.23%	0.646%	.00532%	3.25%	0.617%	.0041%
next fit AO def LIFO	3.12%	0.488%	.00395%	3.15%	0.461%	.0038%
next fit AO no-foot	3.03%	0.388%	.00316%	3.07%	0.361%	.0032%
next fit FIFO	3.12%	0.479%	.00373%	3.15%	0.477%	.0033%
next fit FIFO no-foot	3.02%	0.384%	.00325%	3.05%	0.381%	.0033%
next fit LIFO	2.95%	0.367%	.00391%	3.00%	0.365%	.0038%
next fit LIFO def LIFO	3.11%	0.454%	.00442%	3.12%	0.429%	.0039%
next fit LIFO no-foot	2.89%	0.318%	.00366%	2.94%	0.291%	.0037%
next fit LIFO split-14	2.96%	0.387%	.00425%	3.01%	0.363%	.0039%
next fit LIFO split-7	2.95%	0.357%	.00389%	3.00%	0.362%	.0039%
next fit LIFO WPH	2.99%	0.372%	.00395%	3.02%	0.364%	.0038%
simple seg 2^N	3.20%	0.619%	.03015%	3.08%	0.530%	.0173%
simple seg $3 * 2^N$	3.23%	0.603%	.01675%	3.22%	0.536%	.0086%

Table B.14: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for Espresso (Part 2)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
binary buddy	1.51%	0.265%	0.1146%	1.21%	0.236%	0.1087%
best fit AO	1.13%	0.226%	0.1005%	0.97%	0.216%	0.0980%
best fit AO 8K	1.14%	0.229%	0.1003%	0.98%	0.217%	0.0980%
best fit AO def AO	1.15%	0.235%	0.0999%	1.00%	0.225%	0.0972%
best fit AO def FIFO	1.79%	0.248%	0.0999%	1.67%	0.226%	0.0974%
best fit AO def LIFO	1.16%	0.238%	0.0998%	1.00%	0.226%	0.0972%
best fit AO no-foot	1.04%	0.221%	0.0973%	0.91%	0.209%	0.0949%
best fit FIFO	1.12%	0.225%	0.1004%	0.96%	0.216%	0.0980%
best fit FIFO no-foot	1.07%	0.223%	0.0966%	0.91%	0.209%	0.0949%
best fit LIFO	1.11%	0.226%	0.1001%	0.99%	0.218%	0.0976%
best fit LIFO def AO	1.16%	0.239%	0.0996%	1.00%	0.224%	0.0971%
best fit LIFO def FIFO	1.80%	0.248%	0.0996%	1.65%	0.223%	0.0973%
best fit LIFO def LIFO	1.18%	0.235%	0.0993%	0.99%	0.224%	0.0972%
best fit LIFO no-foot	1.05%	0.222%	0.0970%	0.89%	0.211%	0.0949%
best fit LIFO split-14	1.10%	0.226%	0.0999%	0.98%	0.217%	0.0975%
best fit LIFO split-7	1.11%	0.226%	0.0998%	0.98%	0.217%	0.0975%
double buddy 10K	1.17%	0.237%	0.1025%	0.99%	0.224%	0.0998%
double buddy 5K	1.17%	0.235%	0.1022%	1.00%	0.225%	0.0999%
first fit AO	1.10%	0.226%	0.1000%	0.96%	0.215%	0.0980%
first fit AO 8K	1.08%	0.226%	0.0999%	0.96%	0.215%	0.0980%
first fit AO def AO	1.18%	0.238%	0.0998%	1.01%	0.228%	0.0975%
first fit AO def FIFO	1.80%	0.249%	0.0995%	1.68%	0.227%	0.0976%
first fit AO def LIFO	1.17%	0.238%	0.0995%	1.01%	0.226%	0.0973%
first fit AO no-foot	1.01%	0.220%	0.0967%	0.88%	0.209%	0.0948%
first fit FIFO	2.12%	0.407%	0.1075%	1.99%	0.356%	0.1045%
first fit FIFO no-foot	1.98%	0.333%	0.1013%	1.87%	0.298%	0.0993%
first fit LIFO	1.11%	0.335%	0.1970%	1.00%	0.325%	0.1950%

Table B.15: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for Ghostscript (Part 1)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
first fit LIFO def LIFO	1.13%	0.253%	0.1180%	1.01%	0.241%	0.1167%
first fit LIFO no-foot	1.01%	0.323%	0.1907%	0.90%	0.313%	0.1886%
first fit LIFO split-14	1.10%	0.335%	0.1978%	1.00%	0.325%	0.1957%
first fit LIFO split-7	1.09%	0.332%	0.1981%	0.98%	0.323%	0.1960%
half fit	1.20%	0.239%	0.0996%	0.98%	0.224%	0.0971%
Lea 2.5.1	1.47%	0.259%	0.1116%	1.19%	0.246%	0.1083%
Lea 2.5.1 no-foot	1.35%	0.255%	0.1079%	1.12%	0.237%	0.1041%
Lea 2.6.1	1.05%	0.219%	0.0964%	0.90%	0.208%	0.0947%
multi-fit max	1.19%	0.248%	0.0998%	1.01%	0.233%	0.0973%
multi-fit min	1.17%	0.245%	0.1000%	0.99%	0.232%	0.0973%
next fit AO	1.97%	0.705%	0.1502%	1.82%	0.670%	0.1380%
next fit AO 8K	1.99%	0.781%	0.1816%	1.87%	0.752%	0.1662%
next fit AO def AO	1.30%	0.256%	0.1025%	1.10%	0.240%	0.0998%
next fit AO def FIFO	1.89%	0.271%	0.1057%	1.75%	0.240%	0.1027%
next fit AO def LIFO	1.30%	0.254%	0.1027%	1.10%	0.239%	0.1000%
next fit AO no-foot	1.79%	0.607%	0.1289%	1.71%	0.636%	0.1308%
next fit FIFO	2.03%	0.461%	0.1362%	1.92%	0.420%	0.1329%
next fit FIFO no-foot	1.81%	0.397%	0.1288%	1.75%	0.376%	0.1275%
next fit LIFO	1.05%	0.351%	0.2207%	0.97%	0.339%	0.2187%
next fit LIFO def LIFO	1.14%	0.268%	0.1315%	0.98%	0.253%	0.1303%
next fit LIFO no-foot	0.97%	0.329%	0.2057%	0.88%	0.323%	0.2043%
next fit LIFO split-14	1.06%	0.351%	0.2197%	0.98%	0.339%	0.2175%
next fit LIFO split-7	1.05%	0.350%	0.2216%	0.97%	0.339%	0.2195%
next fit LIFO WPH	1.08%	0.348%	0.2213%	0.99%	0.339%	0.2185%
simple seg 2^N	1.60%	0.293%	0.1212%	1.31%	0.260%	0.1158%
simple seg $3 * 2^N$	1.32%	0.277%	0.1121%	1.09%	0.245%	0.1065%

Table B.16: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for Ghostscript (Part 2)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
binary buddy	0.55%	0.099%	0.0831%	0.38%	0.094%	0.0825%
best fit AO	0.47%	0.111%	0.0904%	0.44%	0.103%	0.0902%
best fit AO 8K	0.45%	0.108%	0.0903%	0.43%	0.103%	0.0901%
best fit AO def AO	0.52%	0.107%	0.0888%	0.47%	0.102%	0.0888%
best fit AO def FIFO	0.56%	0.113%	0.0891%	0.53%	0.105%	0.0889%
best fit AO def LIFO	0.54%	0.110%	0.0891%	0.51%	0.104%	0.0889%
best fit AO no-foot	0.42%	0.097%	0.0804%	0.40%	0.091%	0.0801%
best fit FIFO	0.45%	0.108%	0.0904%	0.44%	0.103%	0.0902%
best fit FIFO no-foot	0.42%	0.096%	0.0804%	0.40%	0.091%	0.0801%
best fit LIFO	0.45%	0.110%	0.0903%	0.43%	0.102%	0.0902%
best fit LIFO def AO	0.50%	0.106%	0.0889%	0.47%	0.102%	0.0889%
best fit LIFO def FIFO	0.55%	0.111%	0.0890%	0.53%	0.104%	0.0889%
best fit LIFO def LIFO	0.53%	0.108%	0.0891%	0.51%	0.104%	0.0889%
best fit LIFO no-foot	0.42%	0.096%	0.0805%	0.40%	0.091%	0.0802%
best fit LIFO split-14	0.45%	0.110%	0.0904%	0.44%	0.103%	0.0902%
best fit LIFO split-7	0.44%	0.108%	0.0904%	0.43%	0.102%	0.0902%
double buddy 10K	0.47%	0.093%	0.0793%	0.39%	0.090%	0.0791%
double buddy 5K	0.46%	0.094%	0.0793%	0.39%	0.090%	0.0791%
first fit AO	0.41%	0.105%	0.0898%	0.40%	0.100%	0.0897%
first fit AO 8K	0.41%	0.105%	0.0898%	0.40%	0.100%	0.0896%
first fit AO def AO	0.50%	0.110%	0.0889%	0.46%	0.101%	0.0889%
first fit AO def FIFO	0.55%	0.114%	0.0890%	0.51%	0.104%	0.0890%
first fit AO def LIFO	0.53%	0.112%	0.0890%	0.51%	0.105%	0.0890%
first fit AO no-foot	0.37%	0.092%	0.0793%	0.37%	0.089%	0.0791%
first fit FIFO	0.96%	0.114%	0.0905%	0.83%	0.105%	0.0903%
first fit FIFO no-foot	0.81%	0.101%	0.0799%	0.68%	0.092%	0.0796%
first fit LIFO	0.49%	0.135%	0.1099%	0.46%	0.127%	0.1099%

Table B.17: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for Grobner (Part 1)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
first fit LIFO def LIFO	0.58%	0.174%	0.1343%	0.55%	0.162%	0.1340%
first fit LIFO no-foot	0.44%	0.119%	0.1015%	0.43%	0.115%	0.1015%
first fit LIFO split-14	0.48%	0.130%	0.1089%	0.46%	0.127%	0.1090%
first fit LIFO split-7	0.48%	0.128%	0.1060%	0.47%	0.124%	0.1061%
half fit	0.53%	0.110%	0.0890%	0.51%	0.104%	0.0889%
Lea 2.5.1	0.71%	0.144%	0.0933%	0.68%	0.119%	0.0933%
Lea 2.5.1 no-foot	0.67%	0.131%	0.0854%	0.67%	0.109%	0.0854%
Lea 2.6.1	0.40%	0.094%	0.0804%	0.38%	0.091%	0.0802%
multi-fit max	0.57%	0.128%	0.0933%	0.53%	0.115%	0.0933%
multi-fit min	0.57%	0.115%	0.0918%	0.52%	0.108%	0.0916%
next fit AO	0.76%	0.133%	0.0966%	0.71%	0.120%	0.0965%
next fit AO 8K	0.98%	0.164%	0.0992%	0.88%	0.139%	0.0991%
next fit AO def AO	0.69%	0.169%	0.0980%	0.67%	0.143%	0.0979%
next fit AO def FIFO	0.78%	0.208%	0.1106%	0.75%	0.175%	0.1103%
next fit AO def LIFO	0.71%	0.187%	0.1083%	0.70%	0.160%	0.1080%
next fit AO no-foot	0.80%	0.129%	0.0865%	0.74%	0.111%	0.0865%
next fit FIFO	0.93%	0.140%	0.0972%	0.84%	0.121%	0.0972%
next fit FIFO no-foot	0.96%	0.153%	0.0873%	0.88%	0.125%	0.0874%
next fit LIFO	0.49%	0.133%	0.1063%	0.47%	0.128%	0.1063%
next fit LIFO def LIFO	0.58%	0.166%	0.1241%	0.56%	0.158%	0.1239%
next fit LIFO no-foot	0.44%	0.119%	0.0968%	0.43%	0.114%	0.0968%
next fit LIFO split-14	0.50%	0.134%	0.1067%	0.47%	0.129%	0.1070%
next fit LIFO split-7	0.48%	0.133%	0.1050%	0.47%	0.128%	0.1056%
next fit LIFO WPH	0.45%	0.116%	0.0959%	0.43%	0.111%	0.0959%
simple seg 2^N	0.74%	0.138%	0.1061%	0.54%	0.128%	0.1061%
simple seg $3 * 2^N$	0.54%	0.124%	0.0923%	0.49%	0.110%	0.0922%

Table B.18: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for Grobner (Part 2)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
binary buddy	1.12%	0.688%	0.197%	1.04%	0.679%	0.162%
best fit AO	1.14%	0.695%	0.197%	1.06%	0.687%	0.162%
best fit AO 8K	1.14%	0.694%	0.197%	1.06%	0.687%	0.162%
best fit AO def AO	1.14%	0.693%	0.197%	1.05%	0.684%	0.162%
best fit AO def FIFO	1.17%	0.726%	0.204%	1.08%	0.716%	0.166%
best fit AO def LIFO	1.14%	0.692%	0.197%	1.05%	0.683%	0.163%
best fit AO no-foot	1.13%	0.688%	0.193%	1.05%	0.681%	0.160%
best fit FIFO	1.15%	0.694%	0.197%	1.06%	0.687%	0.162%
best fit FIFO no-foot	1.13%	0.689%	0.193%	1.05%	0.681%	0.160%
best fit LIFO	1.14%	0.694%	0.197%	1.05%	0.686%	0.162%
best fit LIFO def AO	1.14%	0.693%	0.197%	1.05%	0.684%	0.162%
best fit LIFO def FIFO	1.17%	0.725%	0.204%	1.08%	0.716%	0.166%
best fit LIFO def LIFO	1.13%	0.692%	0.197%	1.05%	0.683%	0.163%
best fit LIFO no-foot	1.13%	0.689%	0.193%	1.05%	0.681%	0.160%
best fit LIFO split-14	1.14%	0.694%	0.193%	1.05%	0.686%	0.163%
best fit LIFO split-7	1.14%	0.694%	0.193%	1.05%	0.686%	0.163%
double buddy 10K	1.12%	0.691%	0.199%	1.04%	0.679%	0.162%
double buddy 5K	1.12%	0.688%	0.197%	1.04%	0.680%	0.162%
first fit AO	1.14%	0.693%	0.197%	1.05%	0.685%	0.162%
first fit AO 8K	1.14%	0.692%	0.197%	1.05%	0.685%	0.162%
first fit AO def AO	1.14%	0.693%	0.197%	1.05%	0.684%	0.162%
first fit AO def FIFO	1.17%	0.726%	0.204%	1.08%	0.716%	0.166%
first fit AO def LIFO	1.14%	0.692%	0.197%	1.05%	0.683%	0.163%
first fit AO no-foot	1.13%	0.688%	0.193%	1.05%	0.681%	0.160%
first fit FIFO	1.16%	0.722%	0.208%	1.07%	0.715%	0.168%
first fit FIFO no-foot	1.14%	0.714%	0.207%	1.06%	0.707%	0.169%
first fit LIFO	1.14%	0.700%	0.205%	1.06%	0.692%	0.168%

Table B.19: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for Hyper (Part 1)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
first fit LIFO def LIFO	1.13%	0.693%	0.198%	1.05%	0.685%	0.163%
first fit LIFO no-foot	1.13%	0.694%	0.201%	1.05%	0.687%	0.166%
first fit LIFO split-14	1.14%	0.700%	0.203%	1.06%	0.692%	0.169%
first fit LIFO split-7	1.14%	0.700%	0.203%	1.06%	0.692%	0.169%
half fit	1.14%	0.692%	0.197%	1.05%	0.683%	0.163%
Lea 2.5.1	1.15%	0.697%	0.199%	1.05%	0.688%	0.163%
Lea 2.5.1 no-foot	1.13%	0.691%	0.196%	1.05%	0.683%	0.161%
Lea 2.6.1	1.12%	0.688%	0.194%	1.05%	0.681%	0.160%
multi-fit max	1.13%	0.692%	0.198%	1.05%	0.684%	0.163%
multi-fit min	1.13%	0.692%	0.198%	1.05%	0.684%	0.163%
next fit AO	1.16%	0.723%	0.208%	1.08%	0.716%	0.168%
next fit AO 8K	1.15%	0.723%	0.216%	1.07%	0.715%	0.174%
next fit AO def AO	1.14%	0.693%	0.197%	1.05%	0.684%	0.162%
next fit AO def FIFO	1.17%	0.726%	0.204%	1.08%	0.718%	0.166%
next fit AO def LIFO	1.14%	0.693%	0.198%	1.05%	0.685%	0.163%
next fit AO no-foot	1.14%	0.716%	0.207%	1.06%	0.709%	0.168%
next fit FIFO	1.16%	0.722%	0.208%	1.07%	0.714%	0.168%
next fit FIFO no-foot	1.14%	0.714%	0.208%	1.06%	0.707%	0.169%
next fit LIFO	1.14%	0.700%	0.206%	1.06%	0.693%	0.168%
next fit LIFO def LIFO	1.14%	0.694%	0.198%	1.05%	0.685%	0.163%
next fit LIFO no-foot	1.13%	0.695%	0.202%	1.05%	0.687%	0.167%
next fit LIFO split-14	1.14%	0.700%	0.203%	1.06%	0.693%	0.169%
next fit LIFO split-7	1.14%	0.700%	0.203%	1.06%	0.693%	0.169%
next fit LIFO WPH	1.13%	0.700%	0.205%	1.05%	0.692%	0.168%
simple seg 2^N	1.14%	0.690%	0.197%	1.05%	0.678%	0.162%
simple seg $3 * 2^N$	1.14%	0.688%	0.197%	1.05%	0.678%	0.162%

Table B.20: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for Hyper (Part 2)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
binary buddy	1.31%	0.408%	0.0645%	1.20%	0.357%	0.0516%
best fit AO	1.44%	0.451%	0.0584%	1.39%	0.428%	0.0533%
best fit AO 8K	1.45%	0.455%	0.0588%	1.40%	0.431%	0.0533%
best fit AO def AO	1.50%	0.490%	0.0614%	1.46%	0.460%	0.0538%
best fit AO def FIFO	1.65%	0.595%	0.0625%	1.60%	0.574%	0.0537%
best fit AO def LIFO	1.52%	0.494%	0.0621%	1.47%	0.461%	0.0547%
best fit AO no-foot	1.34%	0.389%	0.0492%	1.29%	0.368%	0.0456%
best fit FIFO	1.44%	0.450%	0.0584%	1.39%	0.428%	0.0533%
best fit FIFO no-foot	1.34%	0.387%	0.0487%	1.29%	0.366%	0.0456%
best fit LIFO	1.43%	0.448%	0.0587%	1.39%	0.428%	0.0534%
best fit LIFO def AO	1.52%	0.497%	0.0619%	1.48%	0.465%	0.0542%
best fit LIFO def FIFO	1.64%	0.598%	0.0621%	1.60%	0.574%	0.0538%
best fit LIFO def LIFO	1.53%	0.495%	0.0611%	1.48%	0.461%	0.0544%
best fit LIFO no-foot	1.33%	0.389%	0.0487%	1.29%	0.367%	0.0454%
best fit LIFO split-14	1.46%	0.454%	0.0594%	1.40%	0.431%	0.0534%
best fit LIFO split-7	1.45%	0.455%	0.0594%	1.40%	0.432%	0.0534%
double buddy 10K	1.32%	0.363%	0.0485%	1.26%	0.336%	0.0458%
double buddy 5K	1.32%	0.361%	0.0483%	1.26%	0.335%	0.0458%
first fit AO	1.43%	0.445%	0.0584%	1.39%	0.432%	0.0532%
first fit AO 8K	1.43%	0.445%	0.0585%	1.39%	0.432%	0.0532%
first fit AO def AO	1.51%	0.484%	0.0617%	1.46%	0.454%	0.0543%
first fit AO def FIFO	1.64%	0.589%	0.0626%	1.59%	0.573%	0.0535%
first fit AO def LIFO	1.52%	0.489%	0.0632%	1.48%	0.462%	0.0547%
first fit AO no-foot	1.33%	0.387%	0.0489%	1.30%	0.374%	0.0458%
first fit FIFO	1.62%	0.619%	0.0613%	1.57%	0.607%	0.0531%
first fit FIFO no-foot	1.54%	0.545%	0.0507%	1.48%	0.525%	0.0457%
first fit LIFO	1.44%	0.464%	0.0659%	1.40%	0.440%	0.0585%

Table B.21: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for P2C (Part 1)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
first fit LIFO def LIFO	1.54%	0.499%	0.0631%	1.49%	0.468%	0.0557%
first fit LIFO no-foot	1.37%	0.418%	0.0533%	1.33%	0.392%	0.0494%
first fit LIFO split-14	1.46%	0.470%	0.0665%	1.42%	0.446%	0.0589%
first fit LIFO split-7	1.46%	0.470%	0.0664%	1.42%	0.446%	0.0589%
half fit	1.53%	0.499%	0.0629%	1.48%	0.463%	0.0543%
Lea 2.5.1	1.58%	0.539%	0.0698%	1.53%	0.510%	0.0587%
Lea 2.5.1 no-foot	1.55%	0.498%	0.0576%	1.49%	0.461%	0.0511%
Lea 2.6.1	1.35%	0.395%	0.0490%	1.30%	0.369%	0.0455%
multi-fit max	1.51%	0.496%	0.0640%	1.46%	0.458%	0.0549%
multi-fit min	1.53%	0.497%	0.0629%	1.49%	0.463%	0.0551%
next fit AO	1.67%	0.629%	0.0682%	1.60%	0.611%	0.0577%
next fit AO 8K	1.67%	0.632%	0.0704%	1.60%	0.613%	0.0579%
next fit AO def AO	1.52%	0.496%	0.0617%	1.48%	0.467%	0.0555%
next fit AO def FIFO	1.64%	0.600%	0.0647%	1.60%	0.581%	0.0557%
next fit AO def LIFO	1.52%	0.493%	0.0645%	1.48%	0.468%	0.0560%
next fit AO no-foot	1.58%	0.567%	0.0588%	1.52%	0.545%	0.0489%
next fit FIFO	1.69%	0.645%	0.0699%	1.61%	0.632%	0.0587%
next fit FIFO no-foot	1.60%	0.576%	0.0566%	1.56%	0.568%	0.0495%
next fit LIFO	1.46%	0.483%	0.0715%	1.42%	0.456%	0.0639%
next fit LIFO def LIFO	1.51%	0.494%	0.0652%	1.47%	0.462%	0.0568%
next fit LIFO no-foot	1.37%	0.427%	0.0583%	1.32%	0.402%	0.0535%
next fit LIFO split-14	1.48%	0.484%	0.0723%	1.43%	0.456%	0.0636%
next fit LIFO split-7	1.48%	0.484%	0.0723%	1.43%	0.456%	0.0637%
next fit LIFO WPH	1.47%	0.485%	0.0662%	1.43%	0.461%	0.0583%
simple seg 2^N	1.71%	0.602%	0.1014%	1.60%	0.563%	0.0914%
simple seg $3 * 2^N$	1.58%	0.542%	0.0758%	1.53%	0.492%	0.0587%

Table B.22: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for P2C (Part 2)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
binary buddy	1.11%	.0038%	.00327%	0.65%	.0038%	.00327%
best fit AO	0.99%	.0037%	.00326%	0.70%	.0038%	.00326%
best fit AO 8K	1.03%	.0037%	.00325%	0.72%	.0038%	.00326%
best fit AO def AO	0.98%	.0038%	.00328%	0.71%	.0038%	.00328%
best fit AO def FIFO	1.67%	.0038%	.00328%	1.05%	.0038%	.00328%
best fit AO def LIFO	0.93%	.0038%	.00328%	0.73%	.0038%	.00329%
best fit AO no-foot	1.01%	.0037%	.00319%	0.67%	.0037%	.00319%
best fit FIFO	0.99%	.0038%	.00326%	0.70%	.0038%	.00326%
best fit FIFO no-foot	1.03%	.0037%	.00319%	0.67%	.0037%	.00319%
best fit LIFO	0.99%	.0037%	.00326%	0.72%	.0037%	.00326%
best fit LIFO def AO	1.09%	.0038%	.00328%	0.73%	.0038%	.00328%
best fit LIFO def FIFO	1.57%	.0038%	.00329%	1.06%	.0038%	.00328%
best fit LIFO def LIFO	0.97%	.0038%	.00328%	0.74%	.0038%	.00328%
best fit LIFO no-foot	1.00%	.0037%	.00320%	0.69%	.0037%	.00320%
best fit LIFO split-14	0.97%	.0038%	.00327%	0.70%	.0037%	.00326%
best fit LIFO split-7	0.96%	.0038%	.00327%	0.71%	.0037%	.00326%
double buddy 10K	0.83%	.0038%	.00326%	0.71%	.0038%	.00326%
double buddy 5K	0.77%	.0038%	.00326%	0.71%	.0038%	.00325%
first fit AO	0.93%	.0038%	.00326%	0.71%	.0038%	.00326%
first fit AO 8K	1.01%	.0038%	.00326%	0.71%	.0038%	.00326%
first fit AO def AO	1.07%	.0038%	.00328%	0.72%	.0038%	.00328%
first fit AO def FIFO	1.50%	.0038%	.00328%	1.03%	.0038%	.00328%
first fit AO def LIFO	1.02%	.0038%	.00328%	0.73%	.0038%	.00328%
first fit AO no-foot	0.97%	.0037%	.00319%	0.68%	.0037%	.00319%
first fit FIFO	1.66%	.0038%	.00330%	1.11%	.0038%	.00330%
first fit FIFO no-foot	1.53%	.0037%	.00320%	1.08%	.0037%	.00324%
first fit LIFO	1.06%	.0038%	.00331%	0.73%	.0038%	.00330%

Table B.23: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for Perl (Part 1)

	8-way set-associative			fully-associative		
Allocator Name	16K	64K	256K	16K	64K	256K
first fit LIFO def LIFO	1.04%	.0038%	.00328%	0.76%	.0038%	.00328%
first fit LIFO no-foot	0.92%	.0037%	.00324%	0.68%	.0037%	.00324%
first fit LIFO split-14	1.05%	.0038%	.00329%	0.72%	.0038%	.00329%
first fit LIFO split-7	1.06%	.0038%	.00331%	0.73%	.0038%	.00330%
half fit	1.09%	.0038%	.00328%	0.74%	.0038%	.00328%
Lea 2.5.1	1.40%	.0038%	.00328%	0.76%	.0038%	.00328%
Lea 2.5.1 no-foot	0.98%	.0037%	.00321%	0.74%	.0037%	.00320%
Lea 2.6.1	1.22%	.0037%	.00319%	0.68%	.0037%	.00319%
multi-fit max	1.30%	.0038%	.00330%	0.77%	.0038%	.00330%
multi-fit min	1.43%	.0038%	.00330%	0.77%	.0038%	.00330%
next fit AO	1.31%	.0038%	.00330%	0.87%	.0038%	.00330%
next fit AO 8K	1.35%	.0039%	.00338%	0.89%	.0039%	.00337%
next fit AO def AO	1.07%	.0038%	.00329%	0.74%	.0038%	.00329%
next fit AO def FIFO	1.66%	.0038%	.00329%	1.14%	.0038%	.00329%
next fit AO def LIFO	1.11%	.0038%	.00330%	0.76%	.0038%	.00330%
next fit AO no-foot	1.19%	.0037%	.00325%	0.84%	.0037%	.00324%
next fit FIFO	1.63%	.0039%	.00330%	0.97%	.0038%	.00330%
next fit FIFO no-foot	1.51%	.0038%	.00325%	0.92%	.0038%	.00325%
next fit LIFO	0.96%	.0038%	.00330%	0.75%	.0038%	.00330%
next fit LIFO def LIFO	1.23%	.0038%	.00328%	0.74%	.0038%	.00328%
next fit LIFO no-foot	0.76%	.0038%	.00330%	0.70%	.0038%	.00330%
next fit LIFO split-14	1.02%	.0039%	.00335%	0.75%	.0039%	.00335%
next fit LIFO split-7	0.96%	.0038%	.00330%	0.75%	.0038%	.00330%
next fit LIFO WPH	1.04%	.0039%	.00328%	0.74%	.0038%	.00328%
simple seg 2^N	1.58%	.0043%	.00360%	0.90%	.0042%	.00361%
simple seg $3 * 2^N$	1.42%	.0039%	.00333%	0.77%	.0039%	.00333%

Table B.24: Cache miss rate for given set-associative cache size (32 byte line size, 8-way set-associative) for Perl (Part 2)

Appendix C

Actual Fragmentation Plots for Selected Allocators

The pictures that follow are fragmentation plots of the form first shown in Section 2.14. These pictures show the heap use across time for each of the selected allocators, *when all overheads have been removed.* As was described in Section 2.14, darker pixels indicate a larger percentage of memory in use.

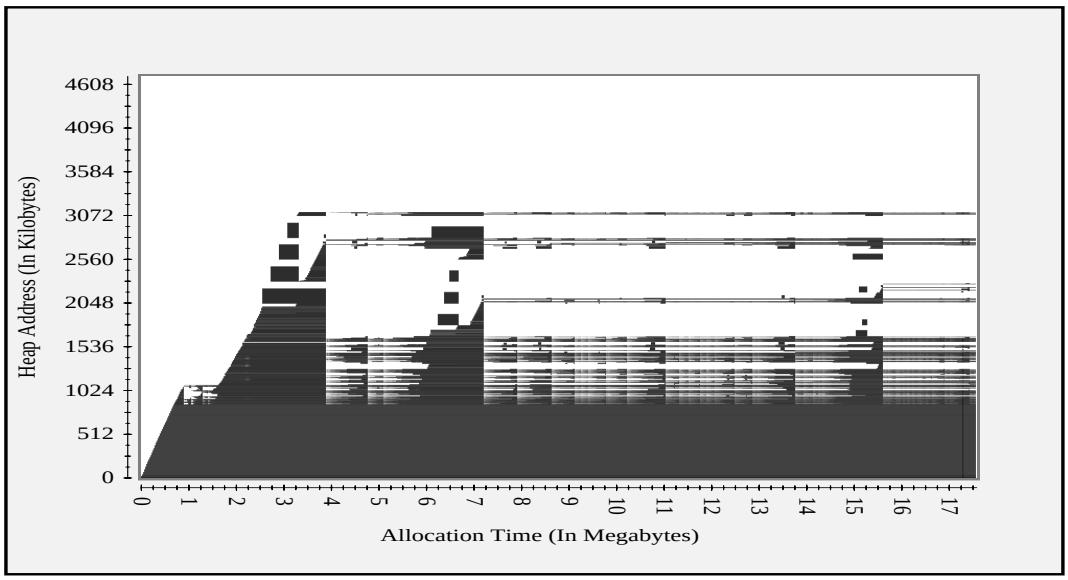

Figure C.1: Fragmentation plot for GCC using the binary-buddy allocator (accounting for all overheads)

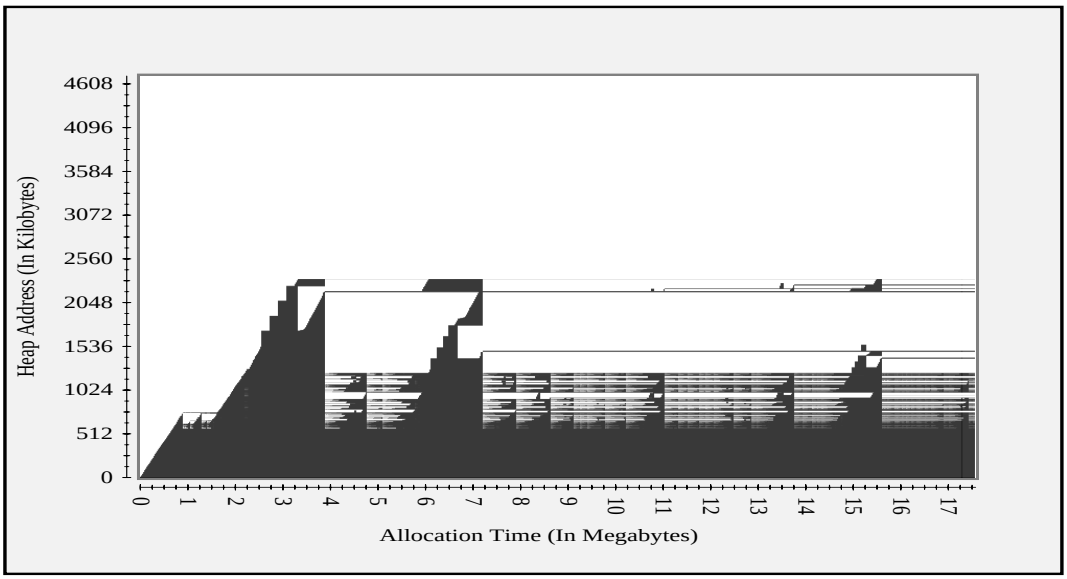

Figure C.2: Fragmentation plot for GCC using the best-fit LIFO no footer allocator (accounting for all overheads)

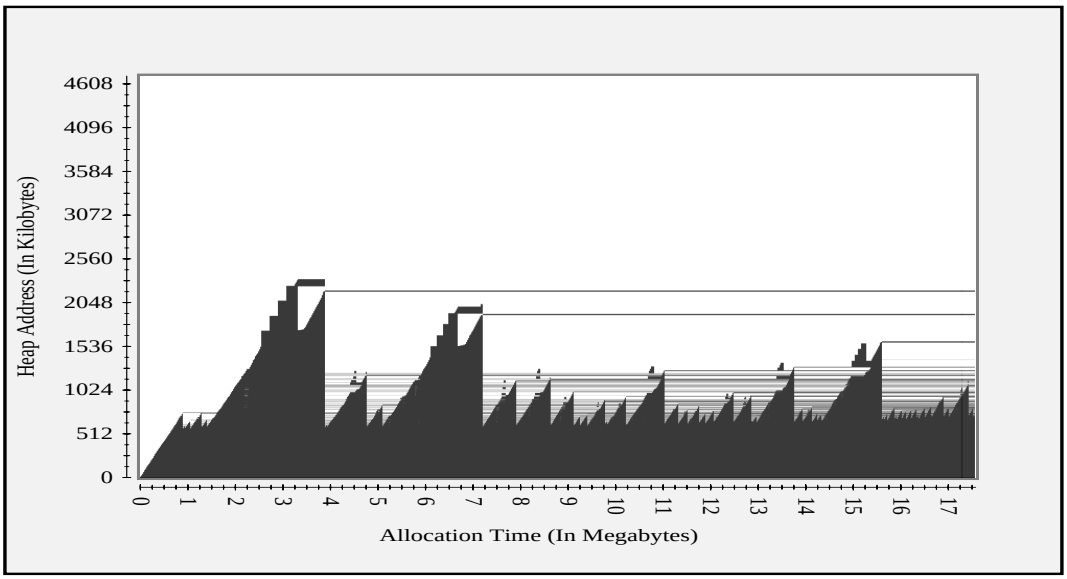

Figure C.3: Fragmentation plot for GCC using the first-fit address-ordered no-footer allocator (accounting for all overheads)

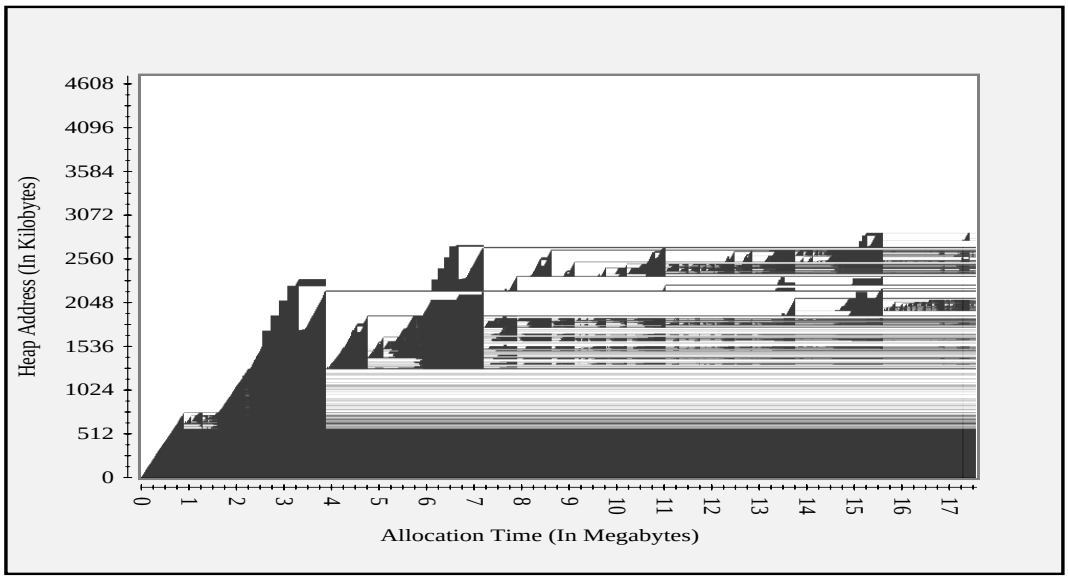

Figure C.4: Fragmentation plot for GCC using the first-fit LIFO no footer allocator (accounting for all overheads)

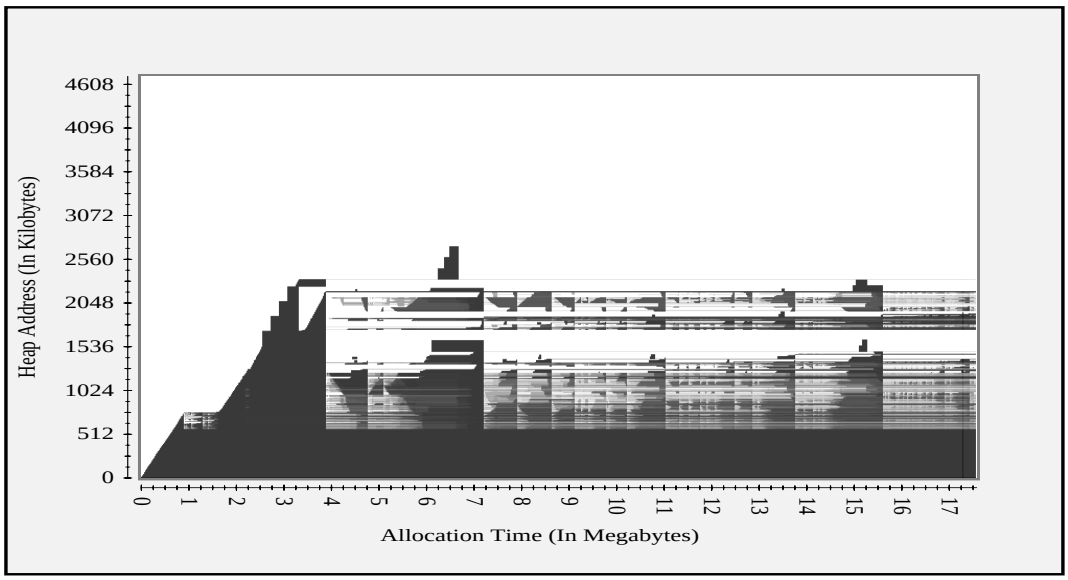

Figure C.5: Fragmentation plot for GCC using the half-fit allocator (accounting for all overheads)

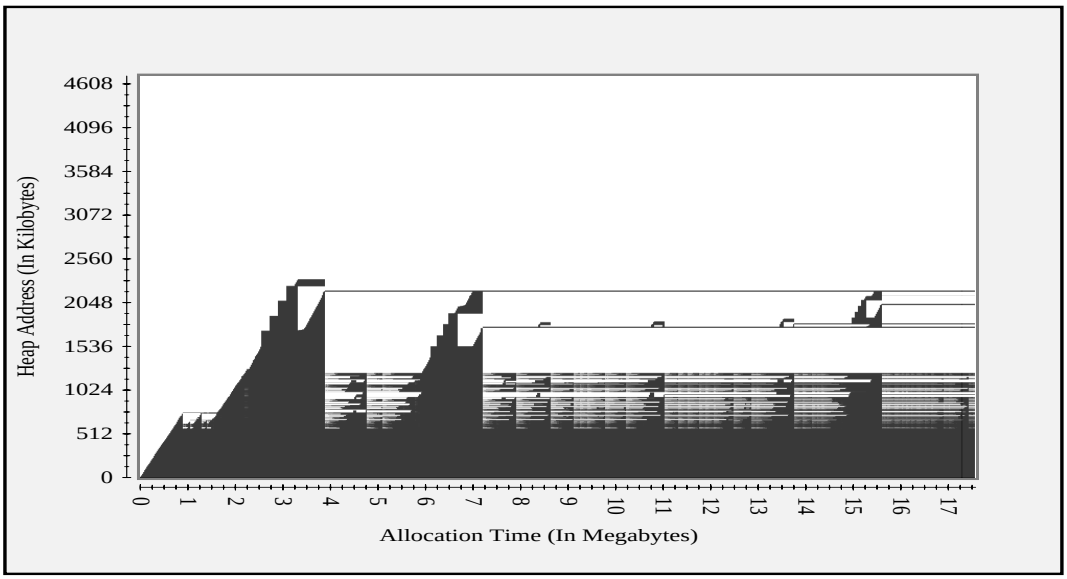

Figure C.6: Fragmentation plot for GCC using Lea's 2.6.1 allocator (accounting for all overheads)

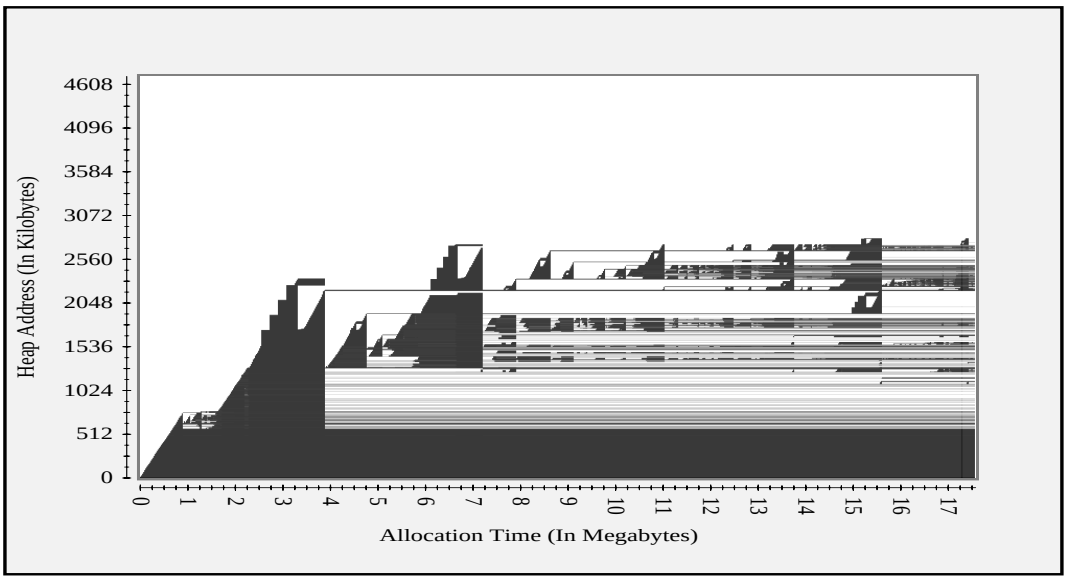

Figure C.7: Fragmentation plot for GCC using the next-fit LIFO no footer allocator (accounting for all overheads)

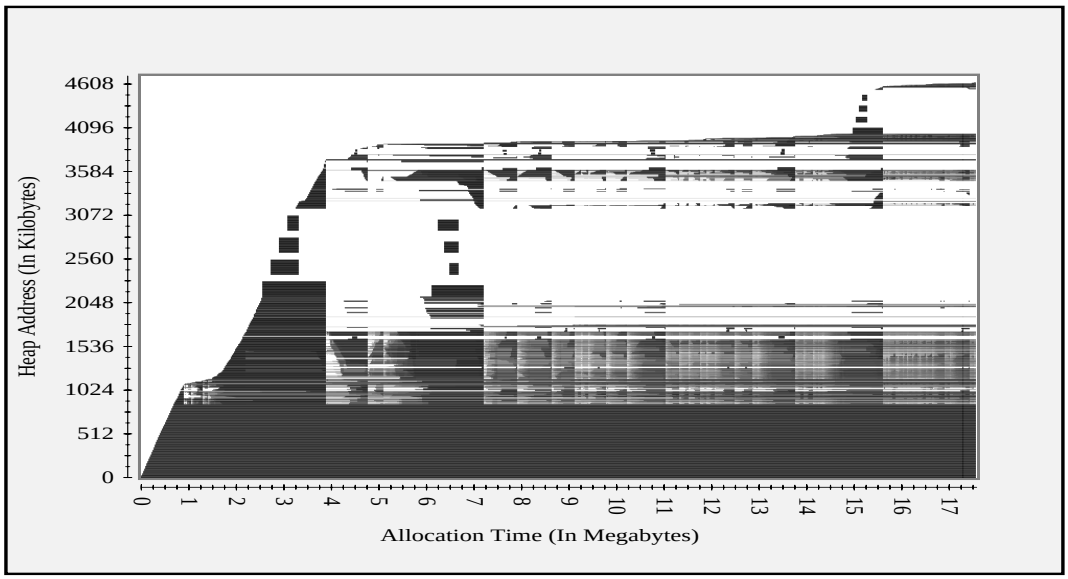

Figure C.8: Fragmentation plot for GCC using the simple segregated storage 2^N allocator (accounting for all overheads)

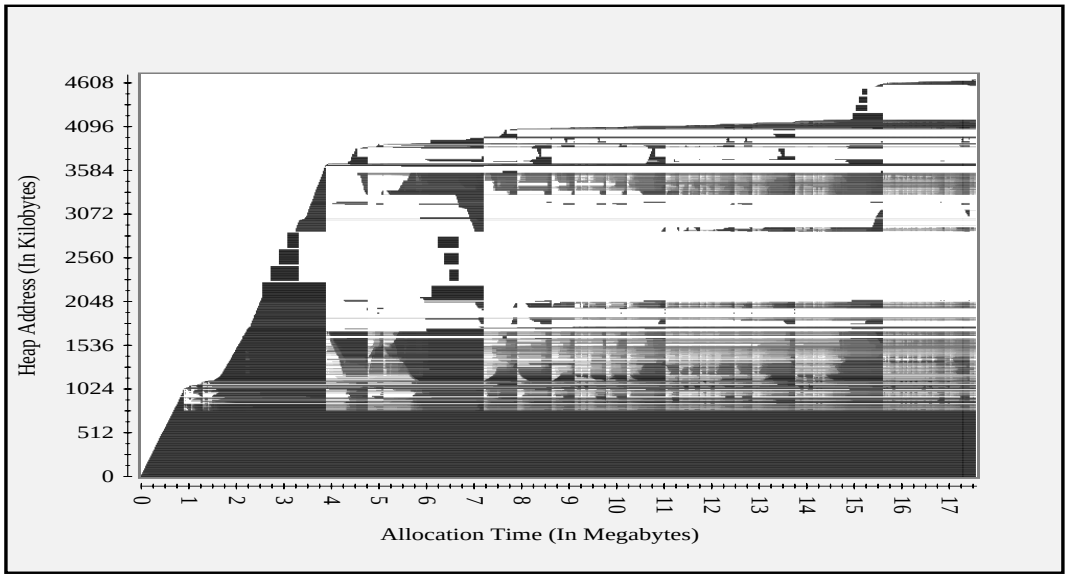

Figure C.9: Fragmentation plot for GCC using the simple segregated storage 2^N & $3 * 2^N$ allocator (accounting for all overheads)

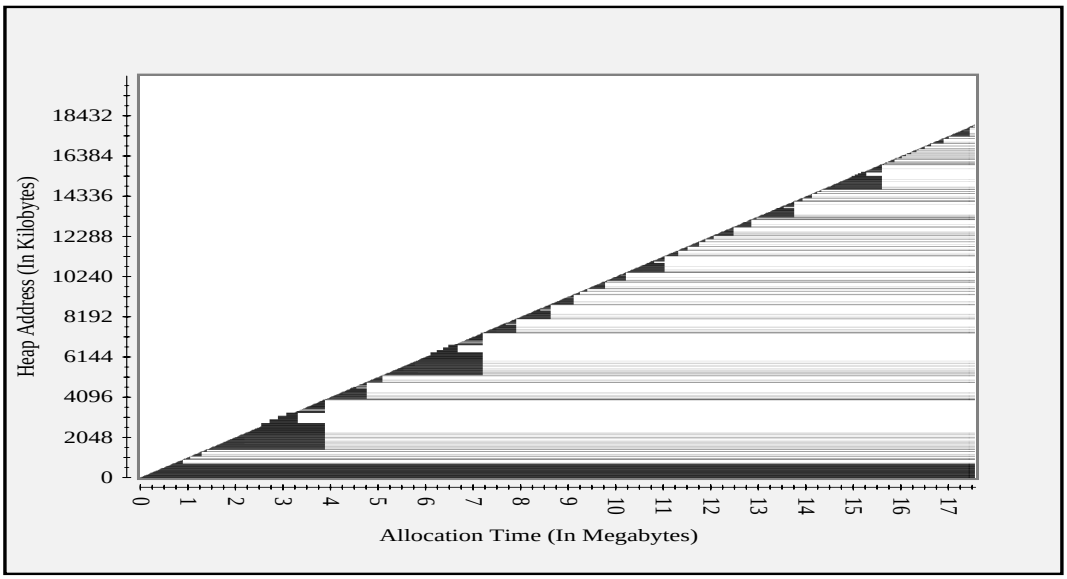

Figure C.10: Fragmentation plot for GCC using the linear allocator

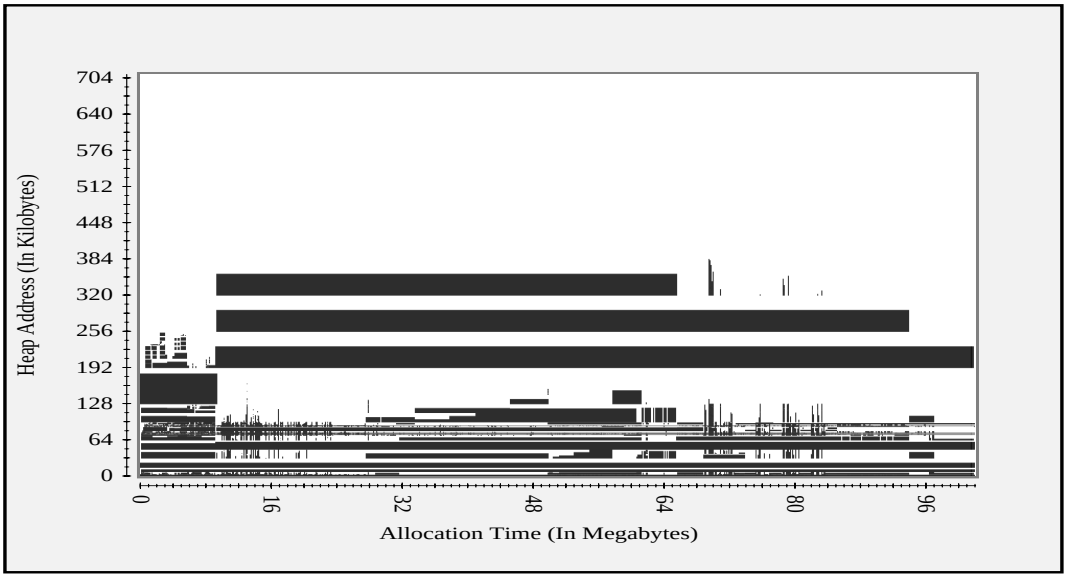

Figure C.11: Fragmentation plot for Espresso using the binary-buddy allocator (accounting for all overheads)

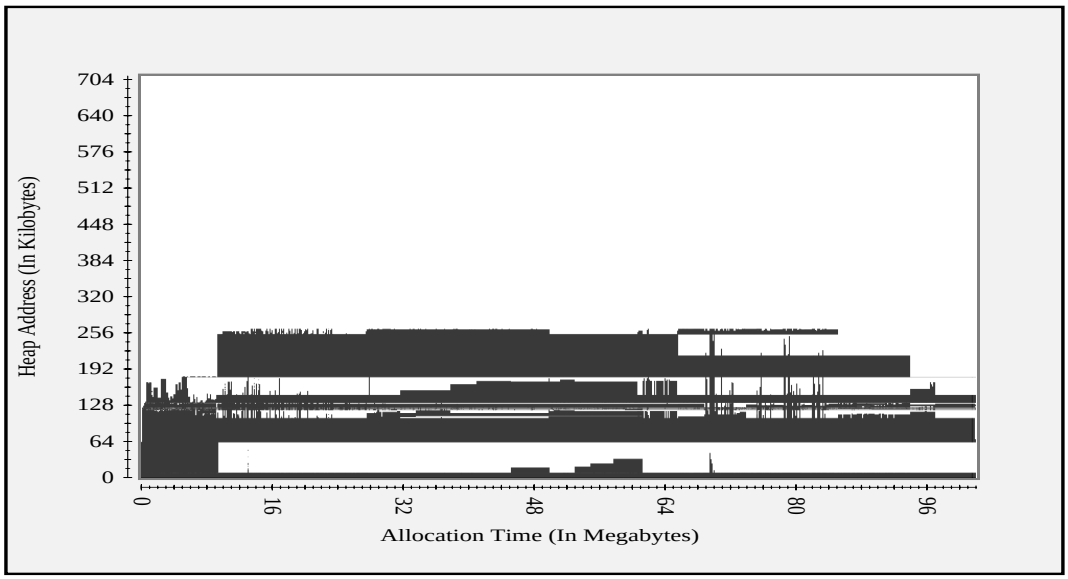

Figure C.12: Fragmentation plot for Espresso using the best-fit LIFO no-footer allocator (accounting for all overheads)

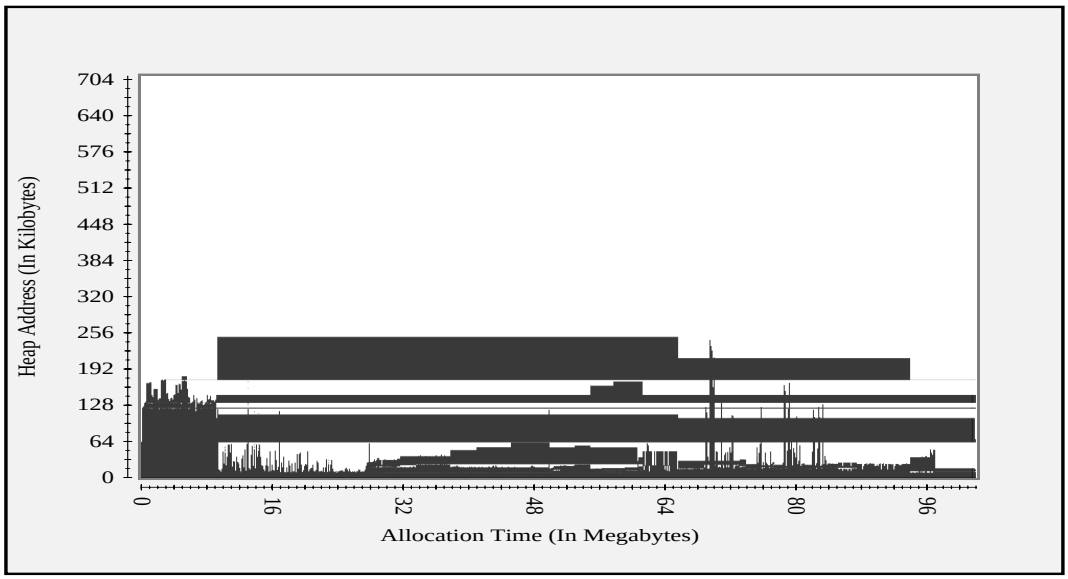

Figure C.13: Fragmentation plot for Espresso using the first-fit address-ordered no-footer allocator (accounting for all overheads)

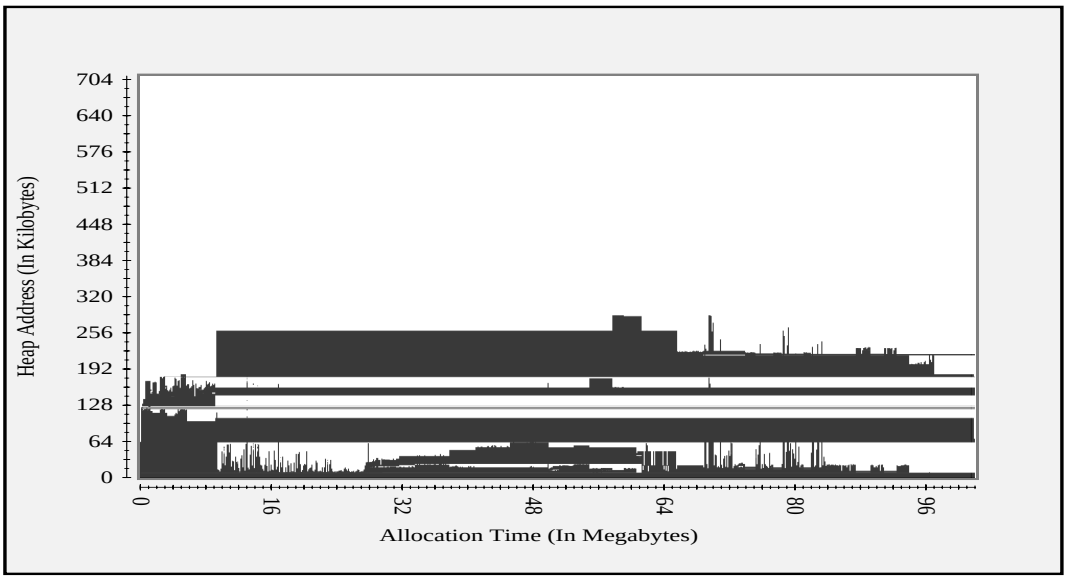

Figure C.14: Fragmentation plot for Espresso using the first-fit LIFO no-footer allocator (accounting for all overheads)

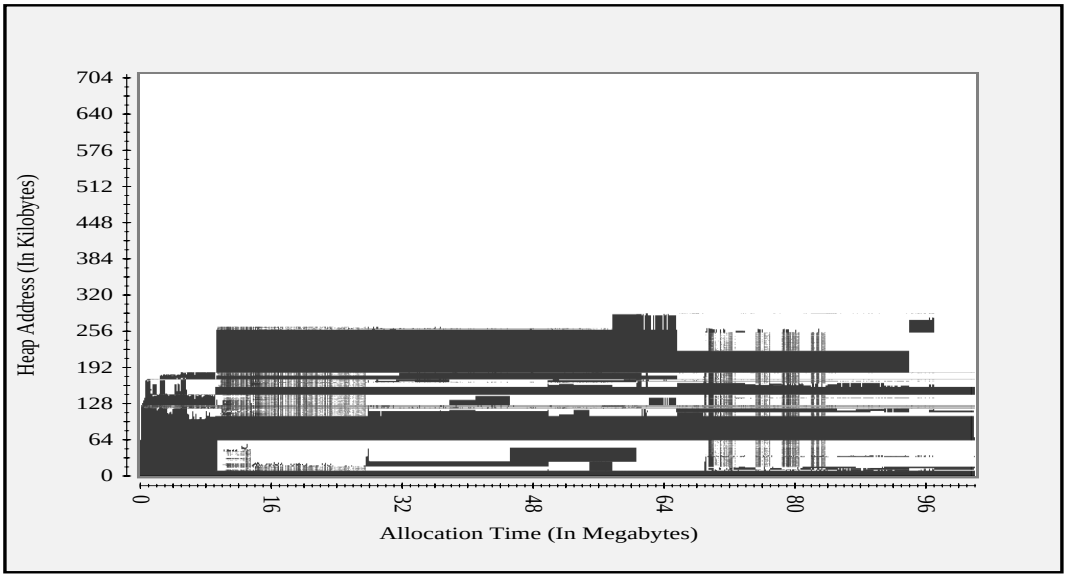

Figure C.15: Fragmentation plot for Espresso using the half-fit allocator (accounting for all overheads)

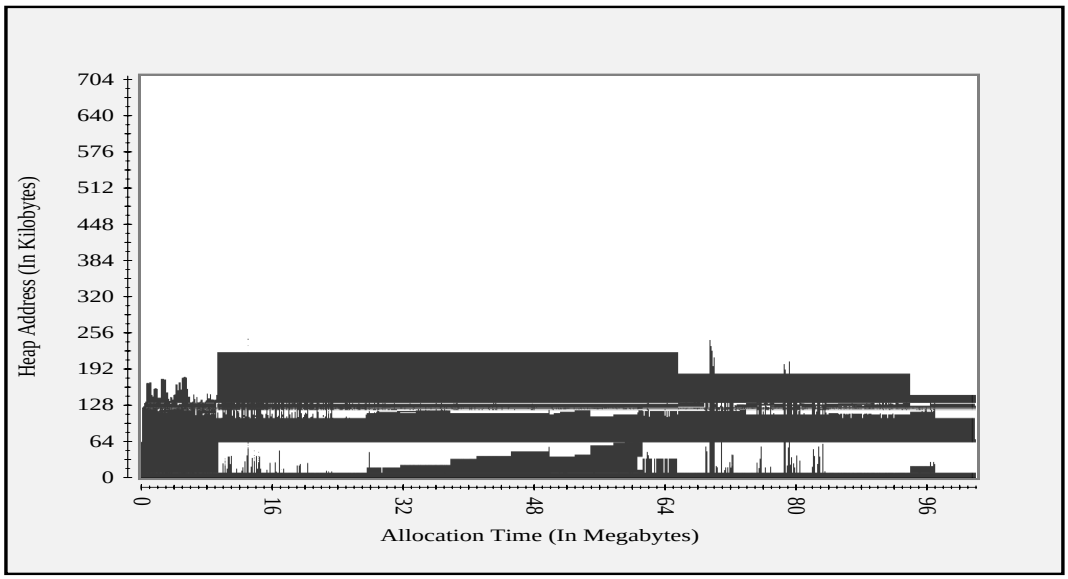

Figure C.16: Fragmentation plot for Espresso using Lea's 2.6.1 allocator (accounting for all overheads)

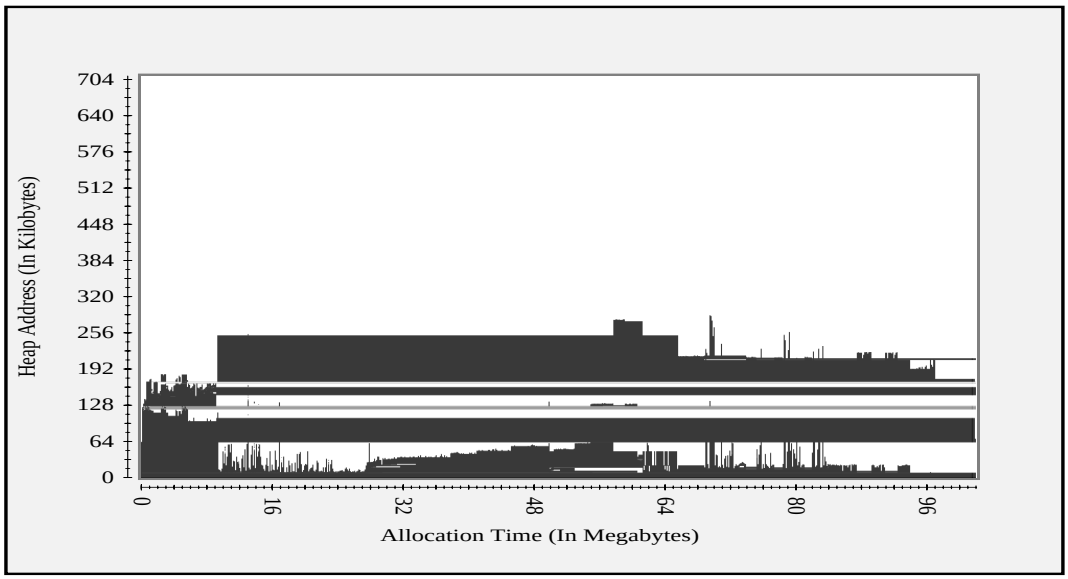

Figure C.17: Fragmentation plot for Espresso using the next-fit LIFO no-footer allocator (accounting for all overheads)

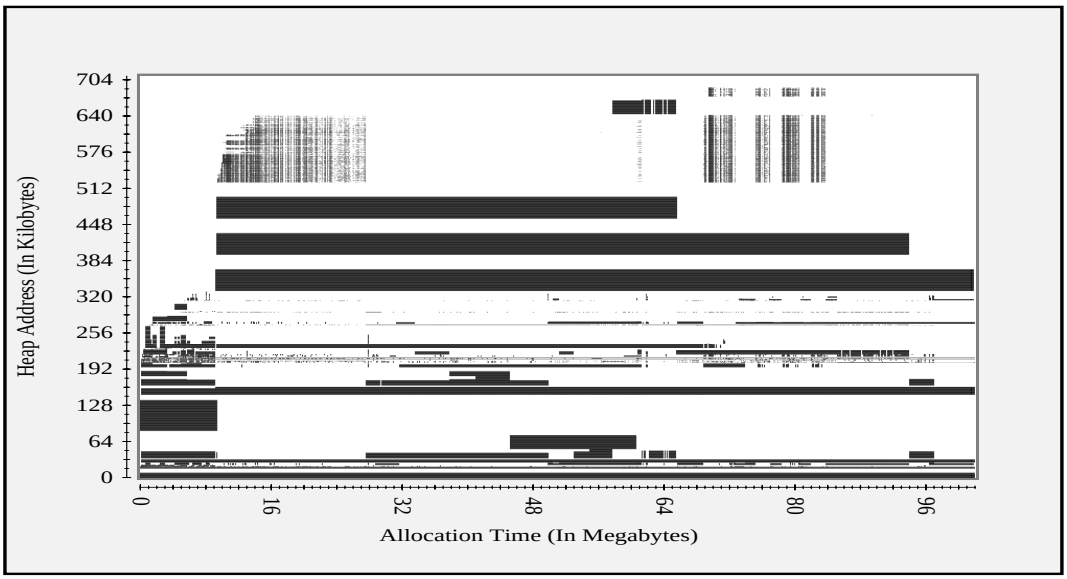

Figure C.18: Fragmentation plot for Espresso using the simple segregated storage 2^N allocator (accounting for all overheads)

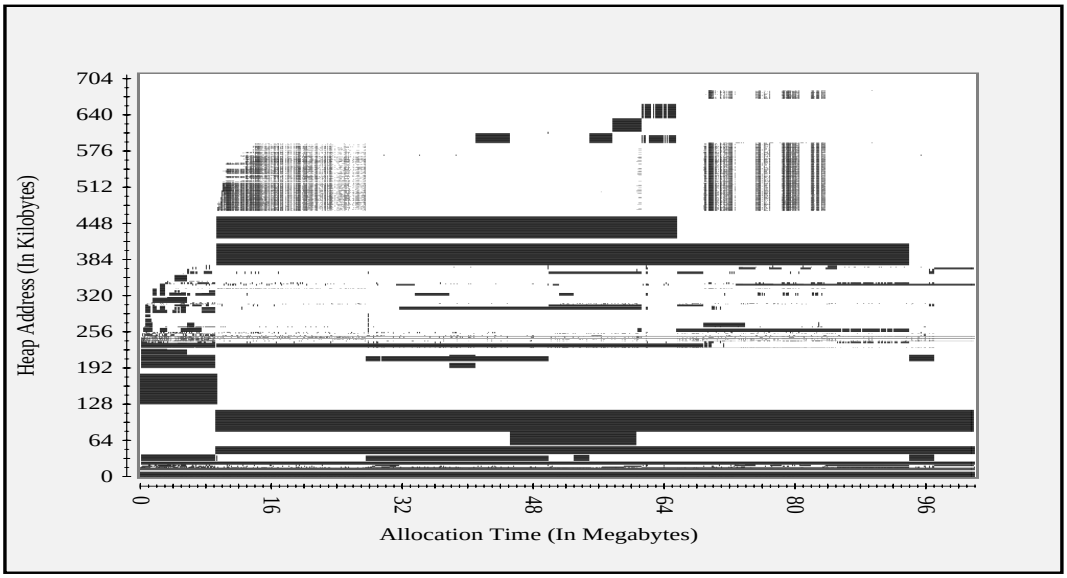

Figure C.19: Fragmentation plot for Espresso using the simple segregated storage 2^N & $3*2^N$ allocator (accounting for all overheads)

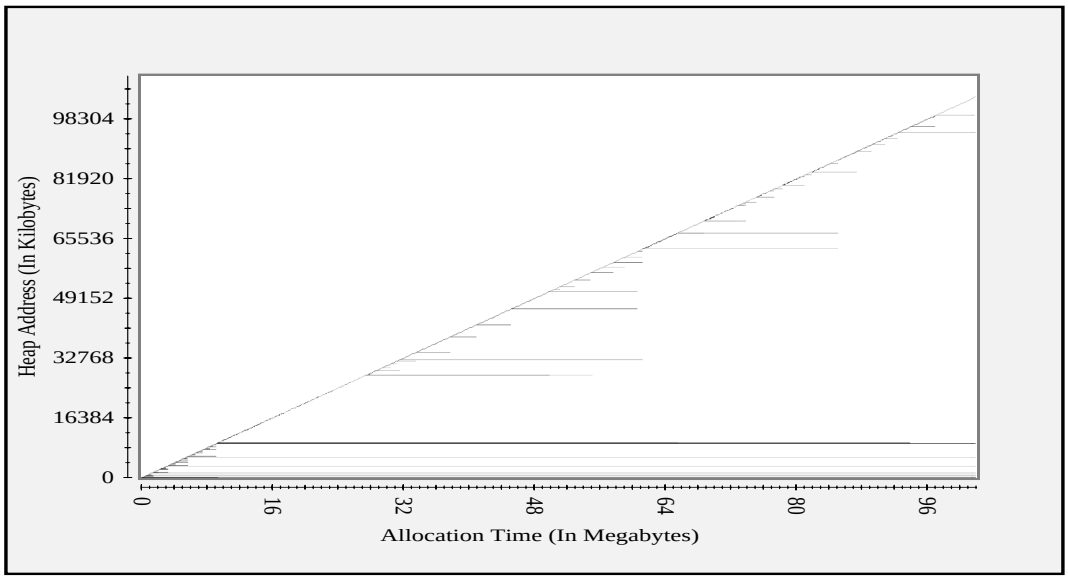

Figure C.20: Fragmentation plot for Espresso using the linear allocator

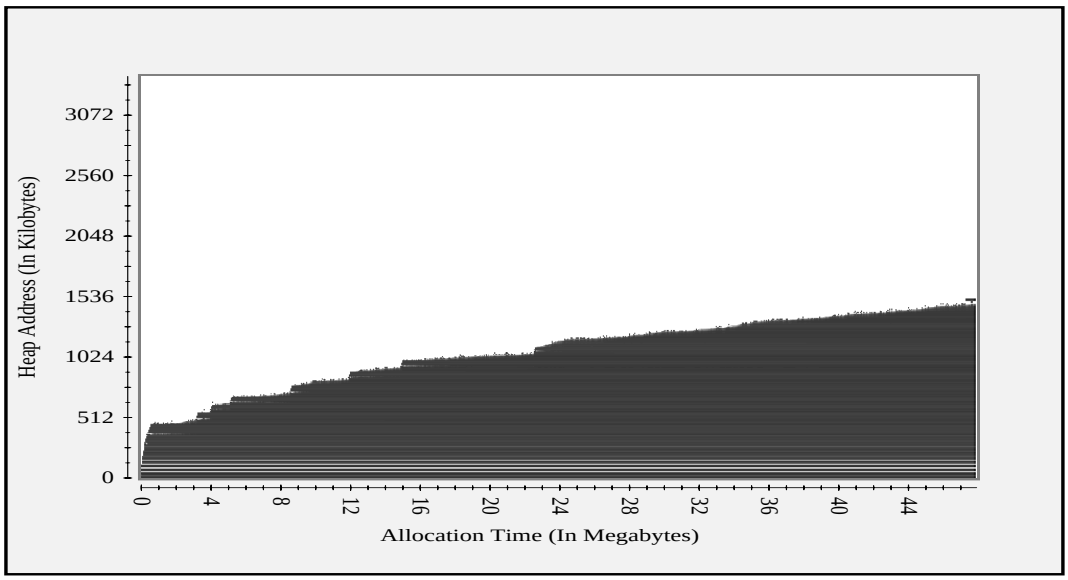

Figure C.21: Fragmentation plot for Ghostscript using the binary-buddy allocator (accounting for all overheads)

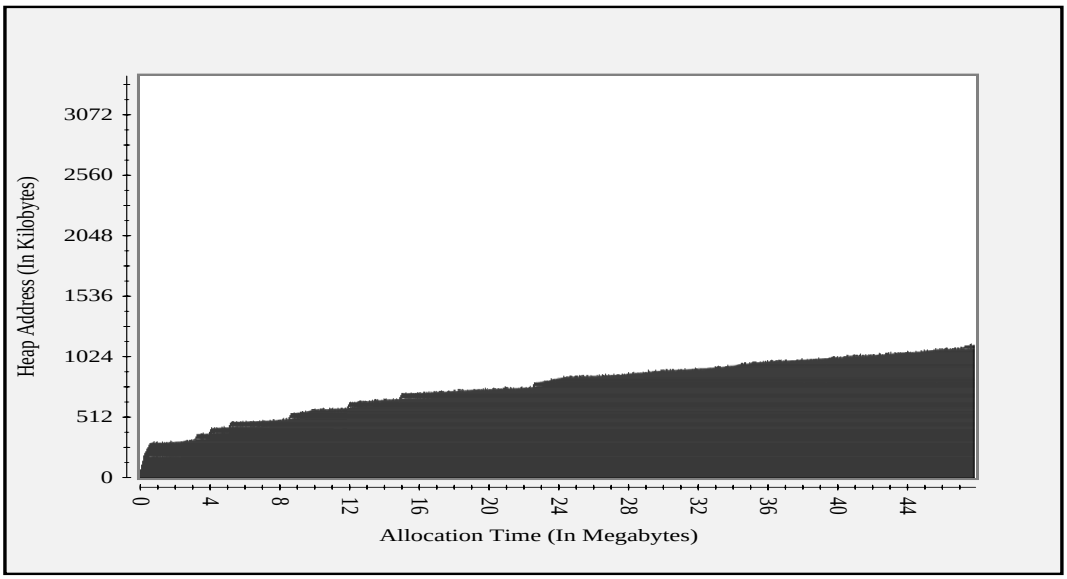

Figure C.22: Fragmentation plot for Ghostscript using the best-fit LIFO no-footer allocator (accounting for all overheads)

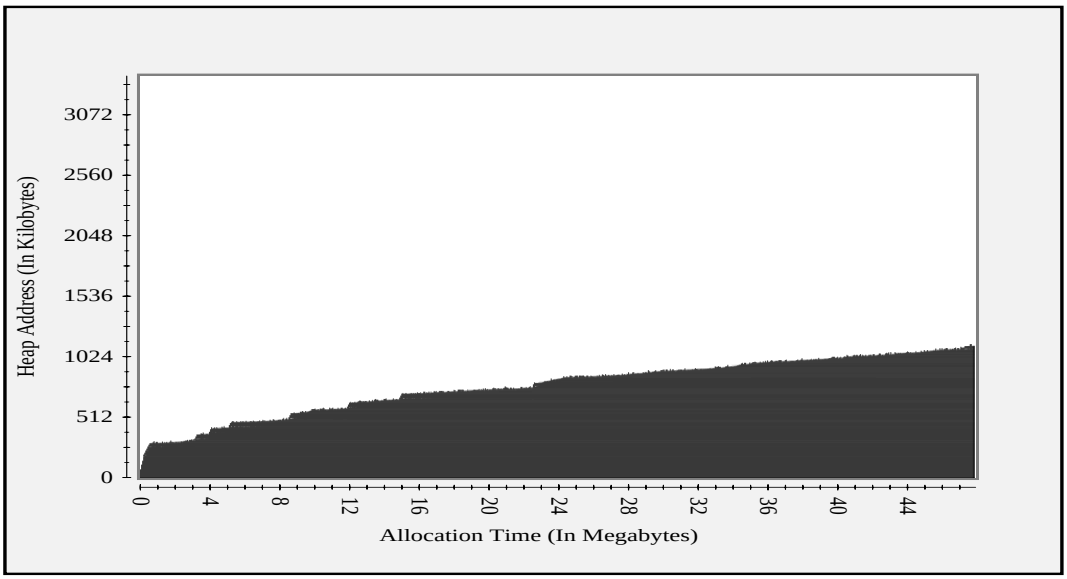

Figure C.23: Fragmentation plot for Ghostscript using the first-fit address-ordered no-footer allocator (accounting for all overheads)

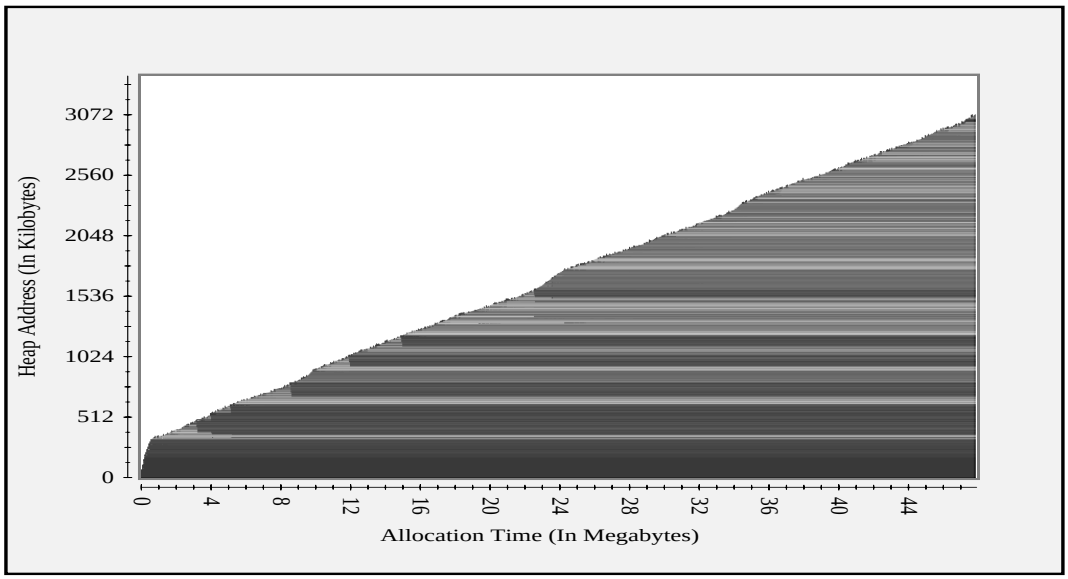

Figure C.24: Fragmentation plot for Ghostscript using the first-fit LIFO no-footer allocator (accounting for all overheads)

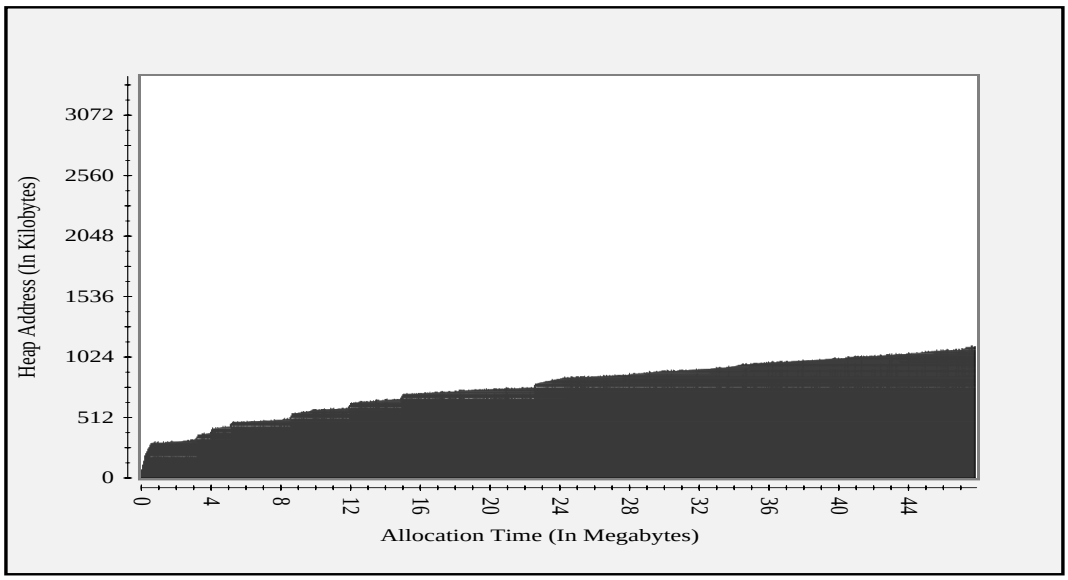

Figure C.25: Fragmentation plot for Ghostscript using the half-fit allocator (accounting for all overheads)

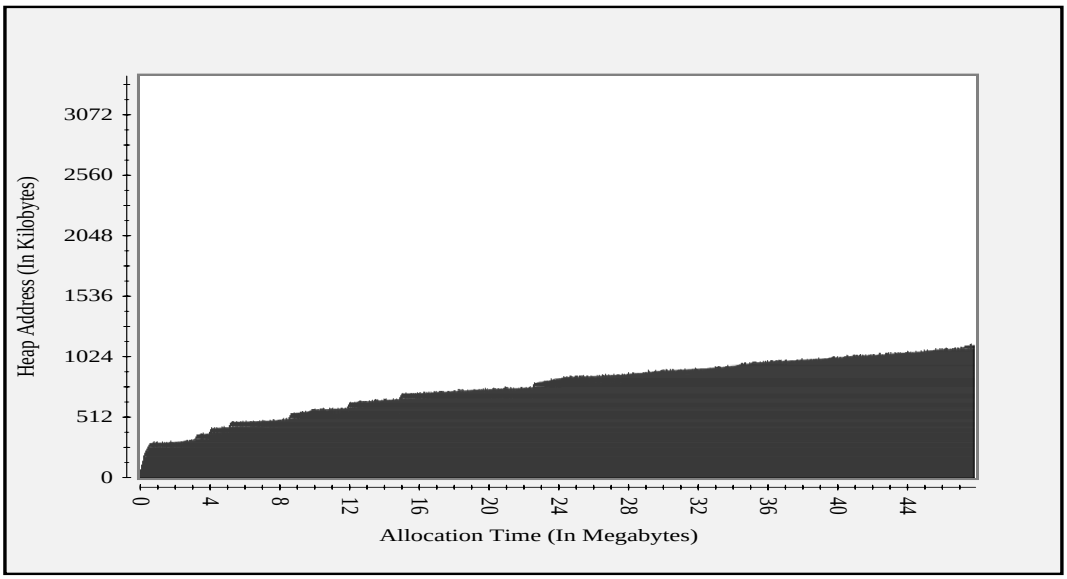

Figure C.26: Fragmentation plot for Ghostscript using Lea's 2.6.1 allocator (accounting for all overheads)

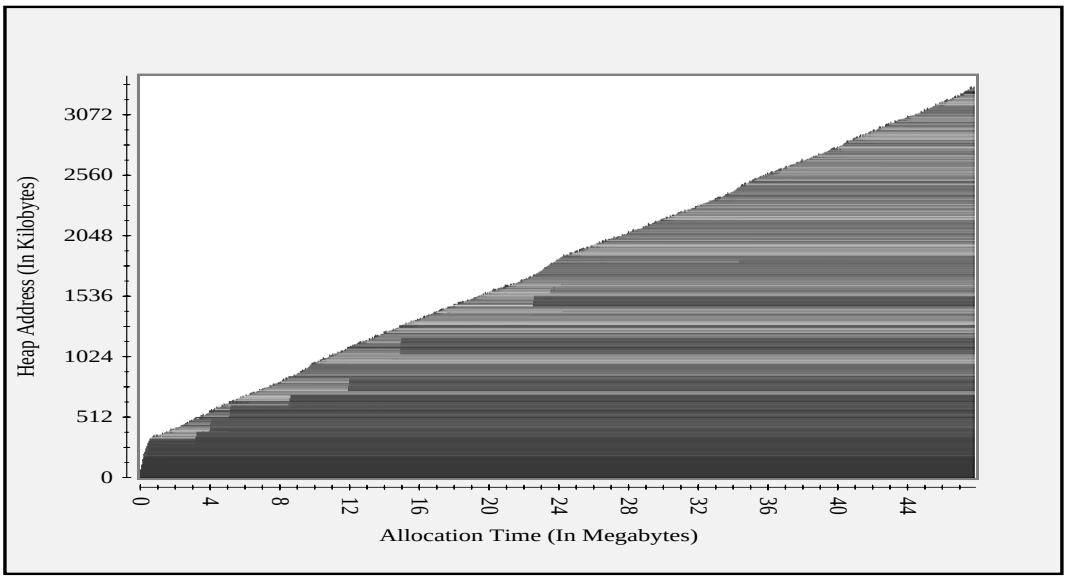

Figure C.27: Fragmentation plot for Ghostscript using the next-fit LIFO no-footer allocator (accounting for all overheads)

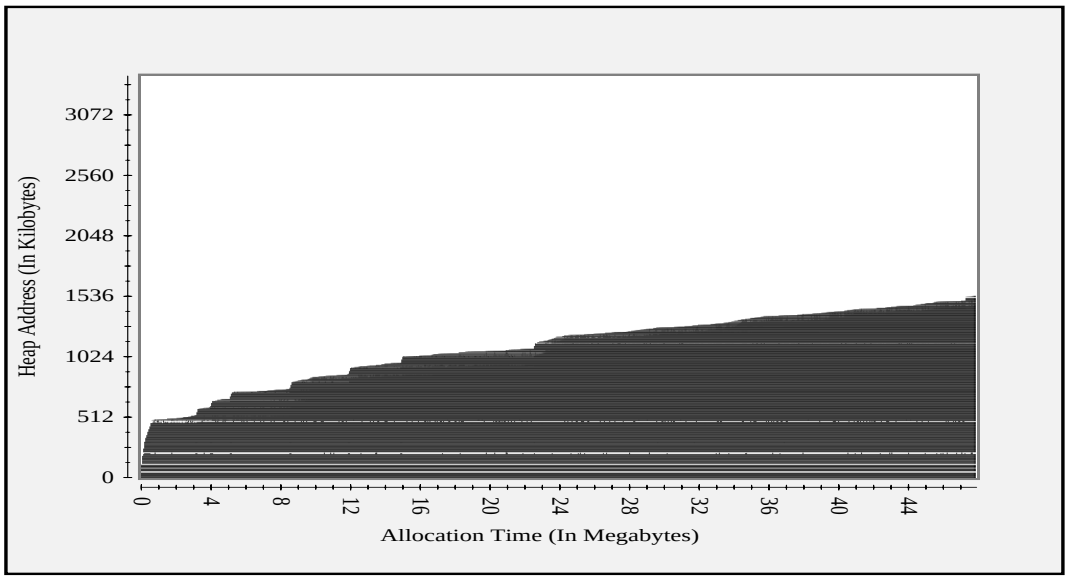

Figure C.28: Fragmentation plot for Ghostscript using the simple segregated storage 2^N allocator (accounting for all overheads)

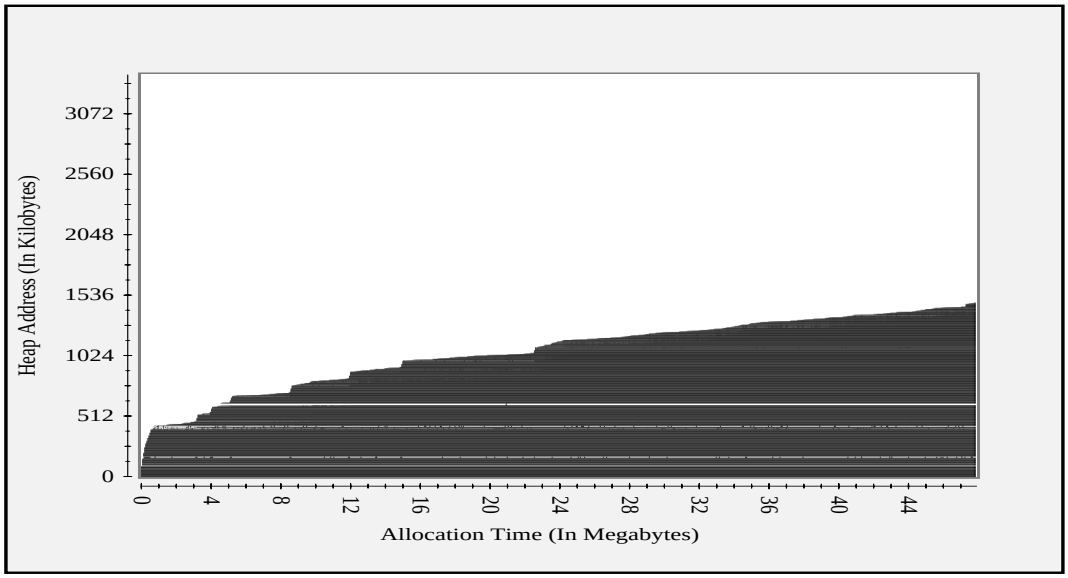

Figure C.29: Fragmentation plot for Ghostscript using the simple segregated storage 2^N & $3 * 2^N$ allocator (accounting for all overheads)

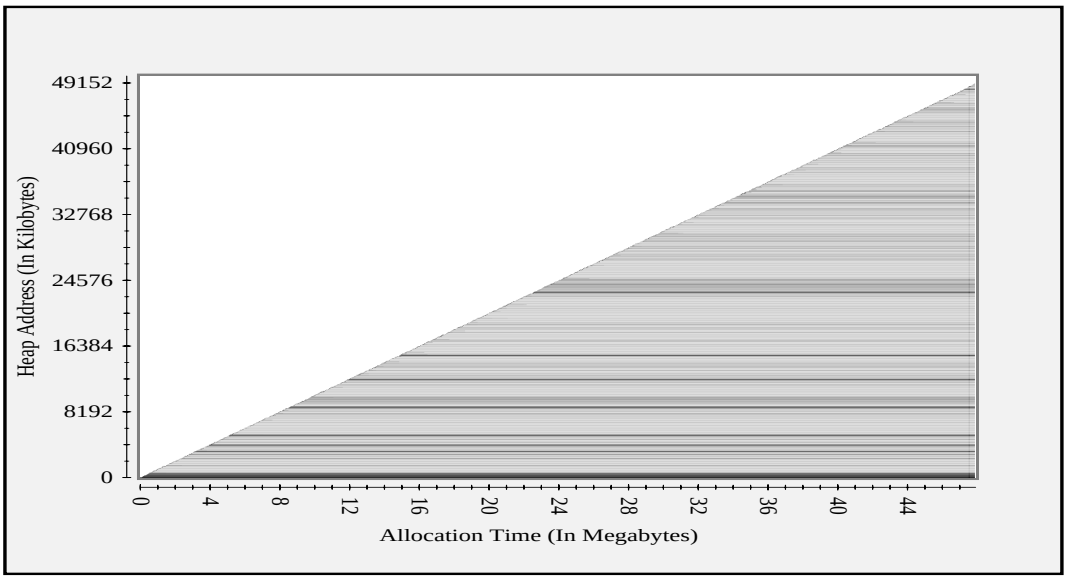

Figure C.30: Fragmentation plot for Ghostscript using the linear allocator

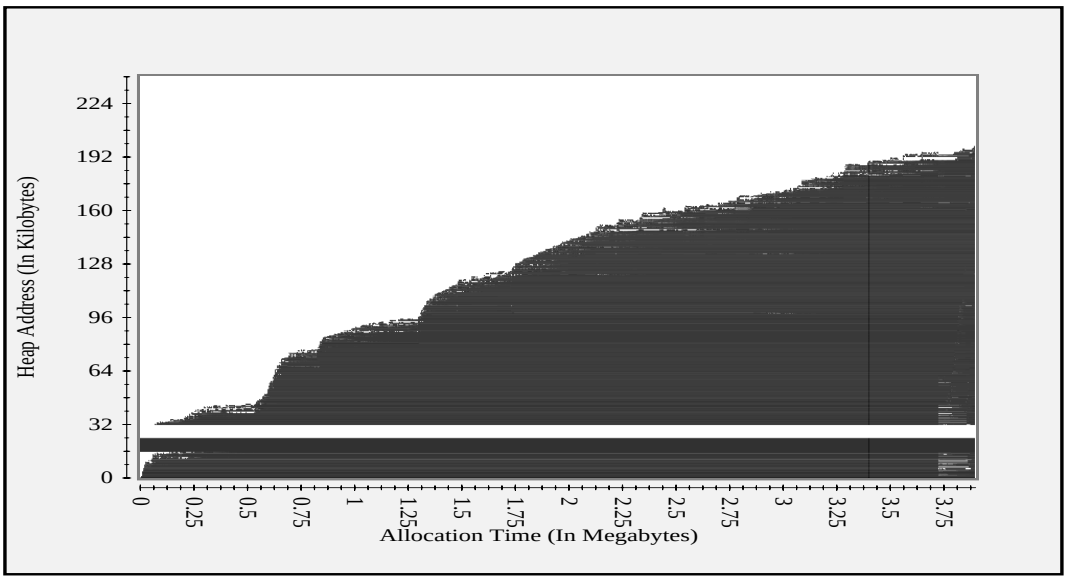

Figure C.31: Fragmentation plot for Grobner using the binary-buddy allocator (accounting for all overheads)

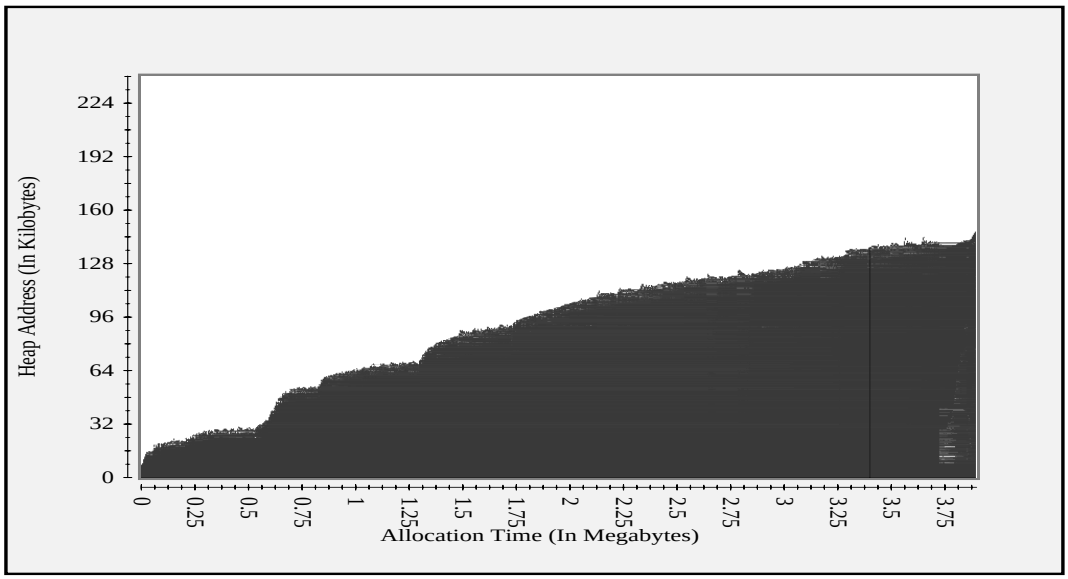

Figure C.32: Fragmentation plot for Grobner using the best-fit LIFO no-footer allocator (accounting for all overheads)

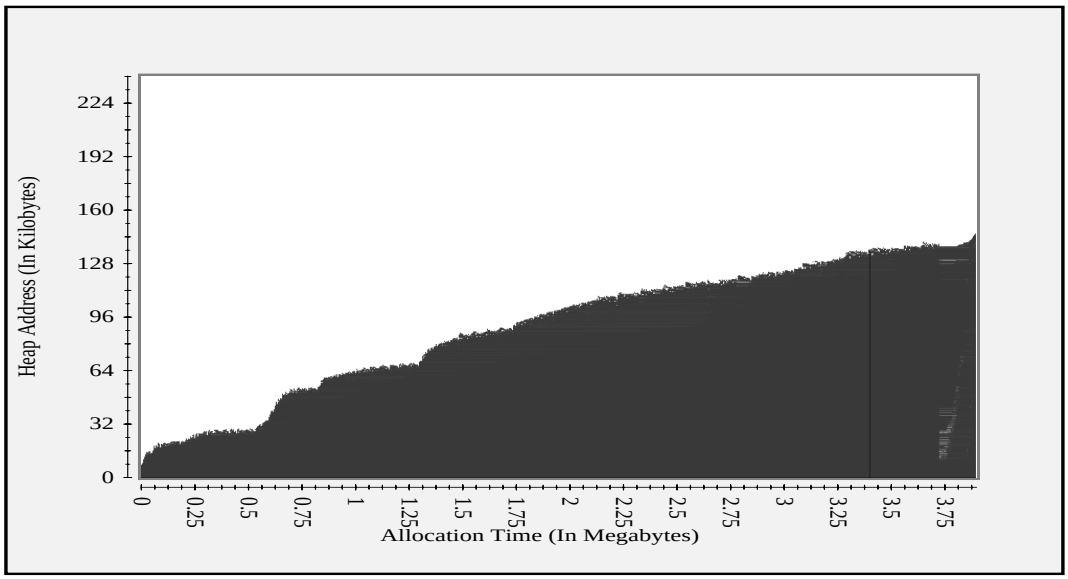

Figure C.33: Fragmentation plot for Grobner using the first-fit address-ordered no-footer allocator (accounting for all overheads)

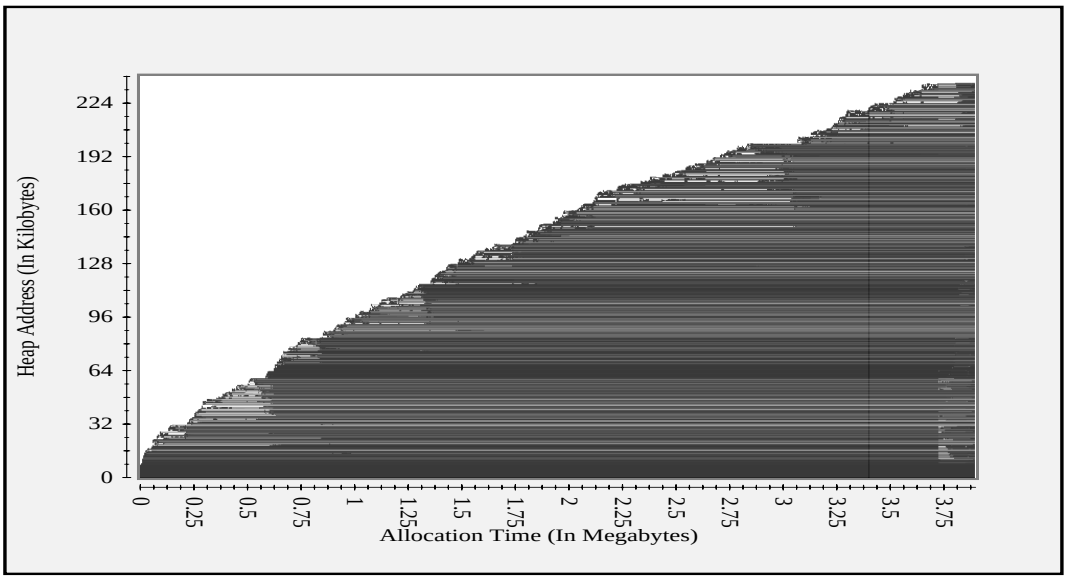

Figure C.34: Fragmentation plot for Grobner using the first-fit LIFO no-footer allocator (accounting for all overheads)

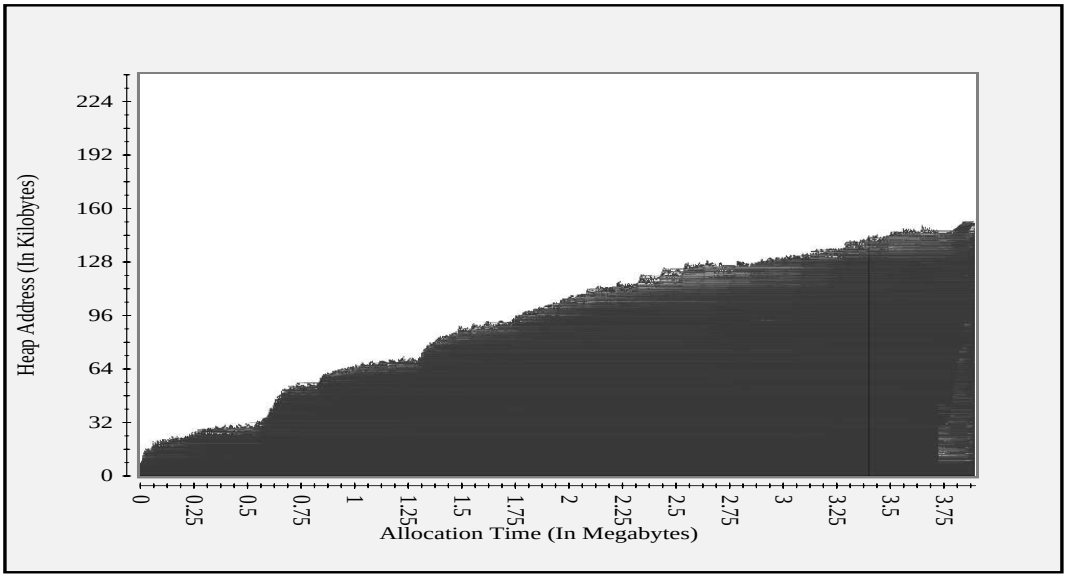

Figure C.35: Fragmentation plot for Grobner using the half-fit allocator (accounting for all overheads)

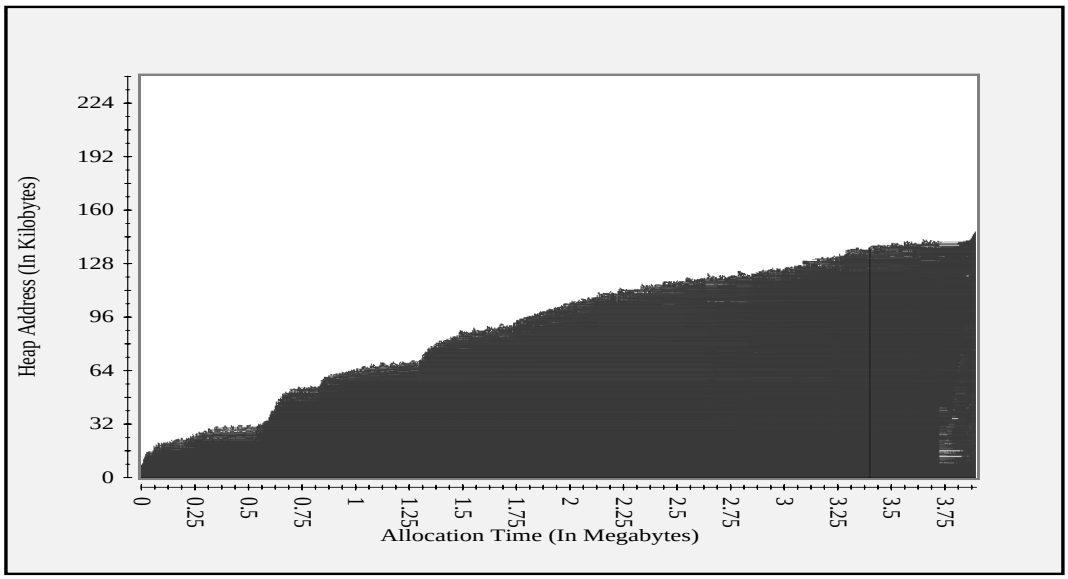

Figure C.36: Fragmentation plot for Grobner using Lea's 2.6.1 allocator (accounting for all overheads)

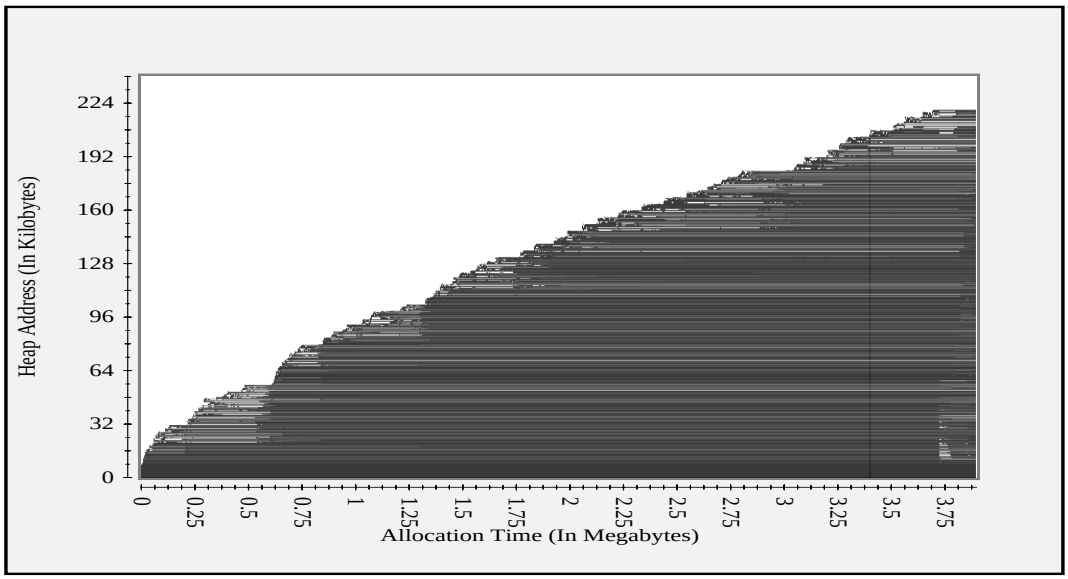

Figure C.37: Fragmentation plot for Grobner using the next-fit LIFO no-footer allocator (accounting for all overheads)

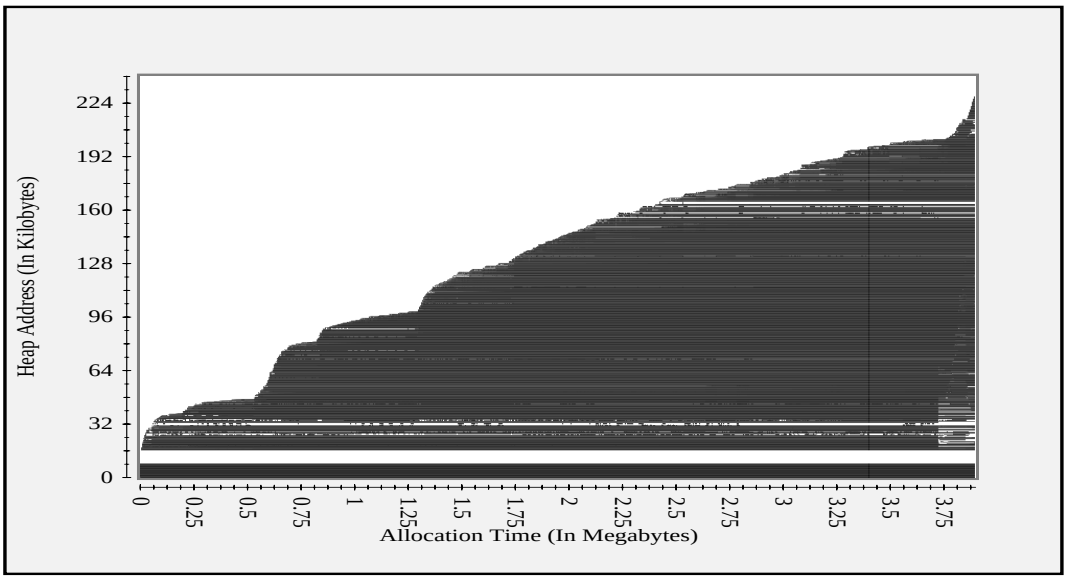

Figure C.38: Fragmentation plot for Grobner using the simple segregated storage 2^N allocator (accounting for all overheads)

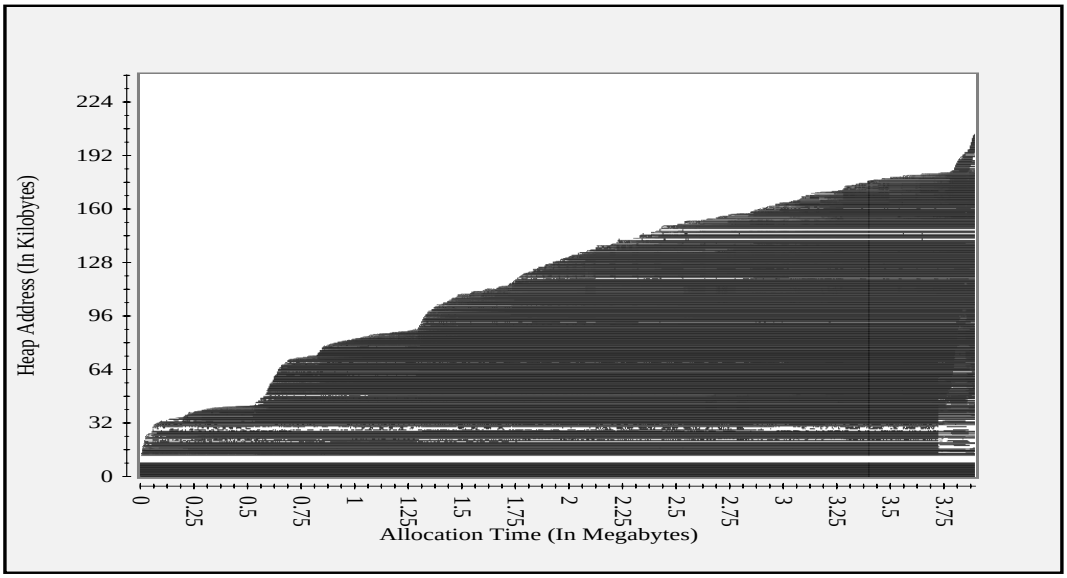

Figure C.39: Fragmentation plot for Grobner using the simple segregated storage 2^N & $3*2^N$ allocator (accounting for all overheads)

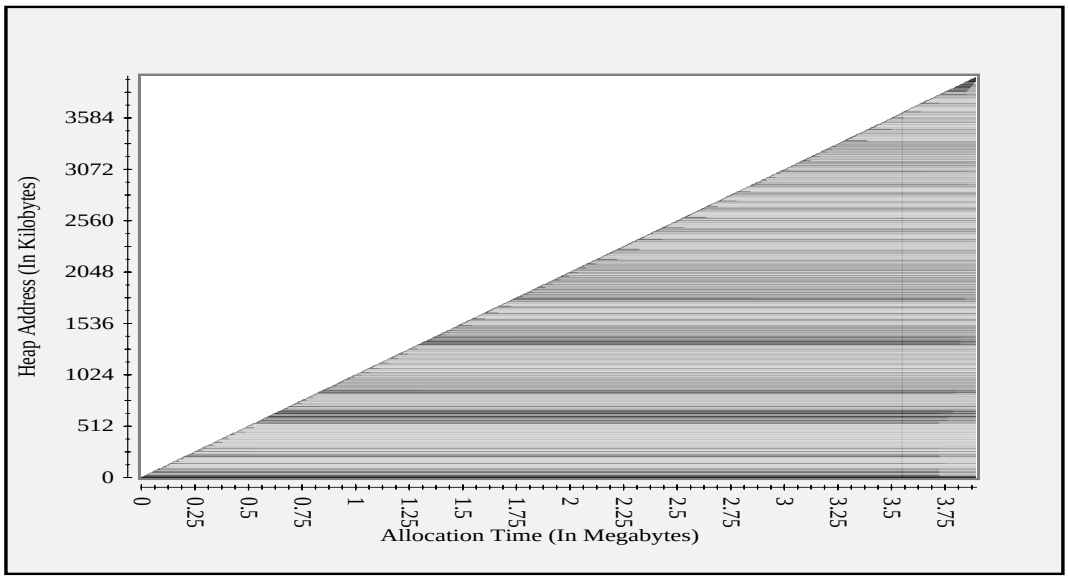

Figure C.40: Fragmentation plot for Grobner using the linear allocator

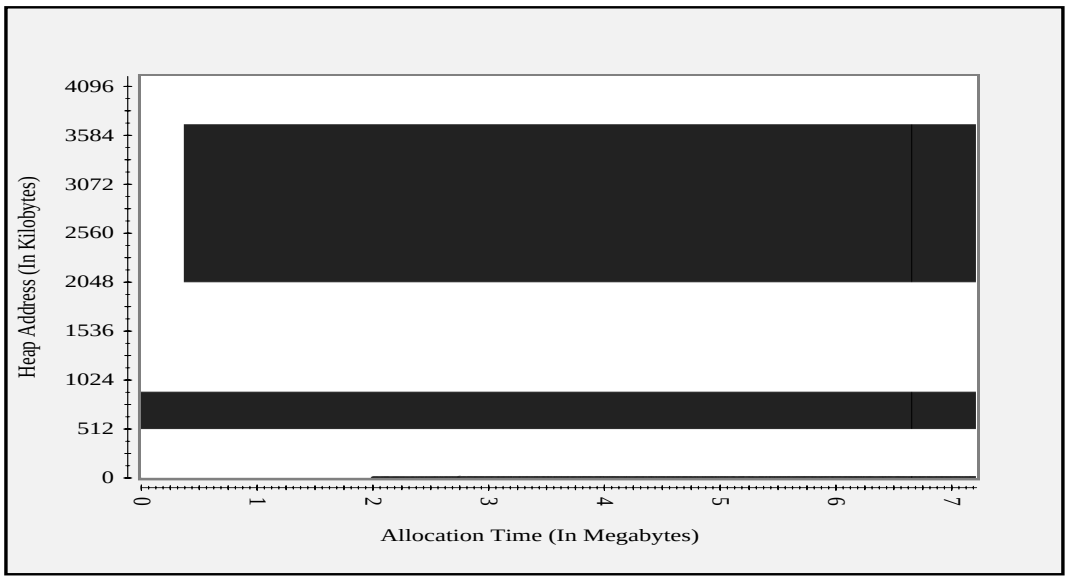

Figure C.41: Fragmentation plot for Hyper using the binary-buddy allocator (accounting for all overheads)

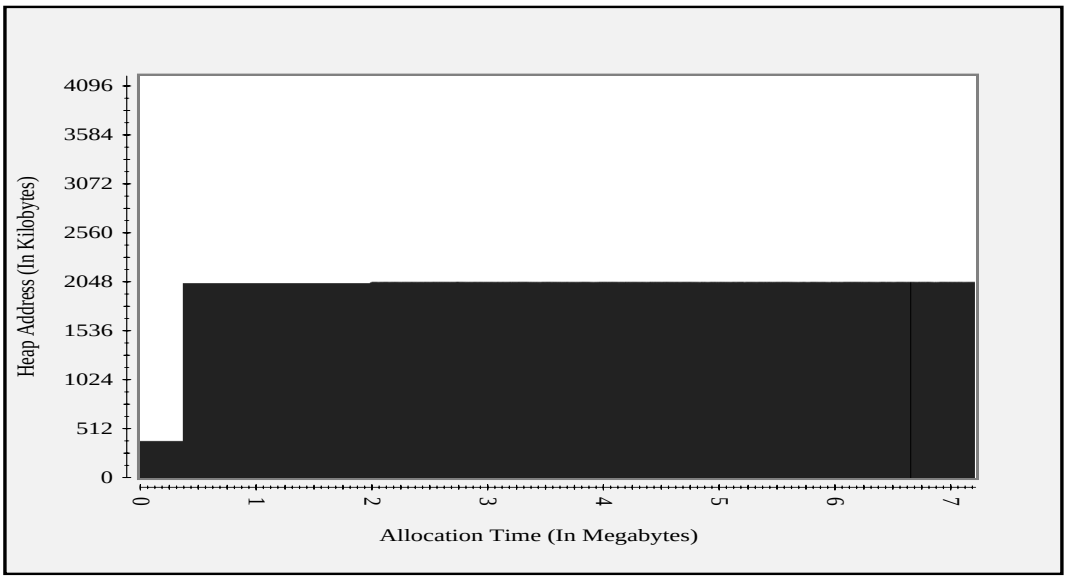

Figure C.42: Fragmentation plot for Hyper using the best-fit LIFO no-footer allocator (accounting for all overheads)

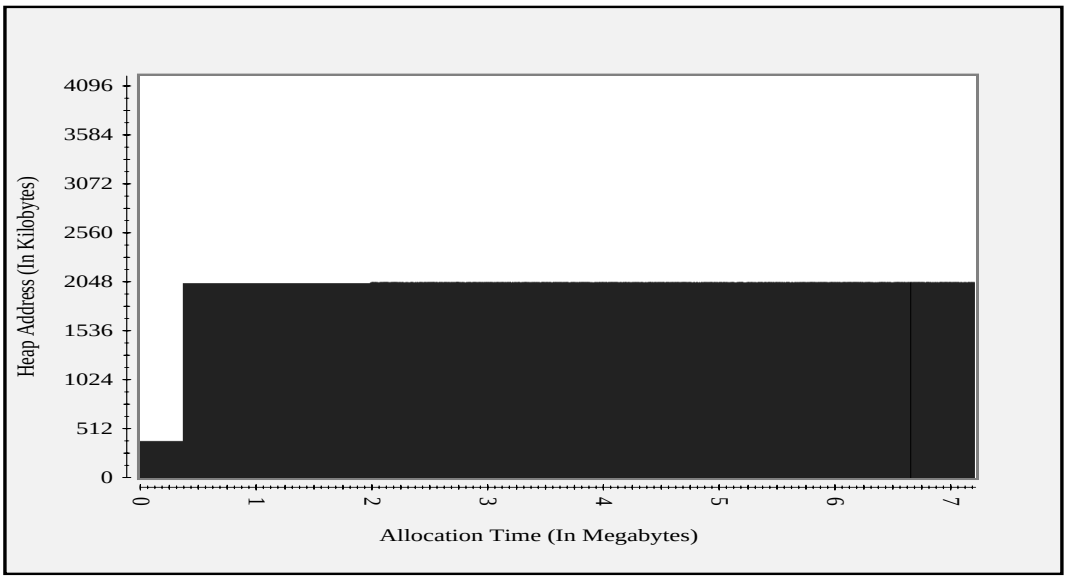

Figure C.43: Fragmentation plot for Hyper using the first-fit address-ordered no-footer allocator (accounting for all overheads)

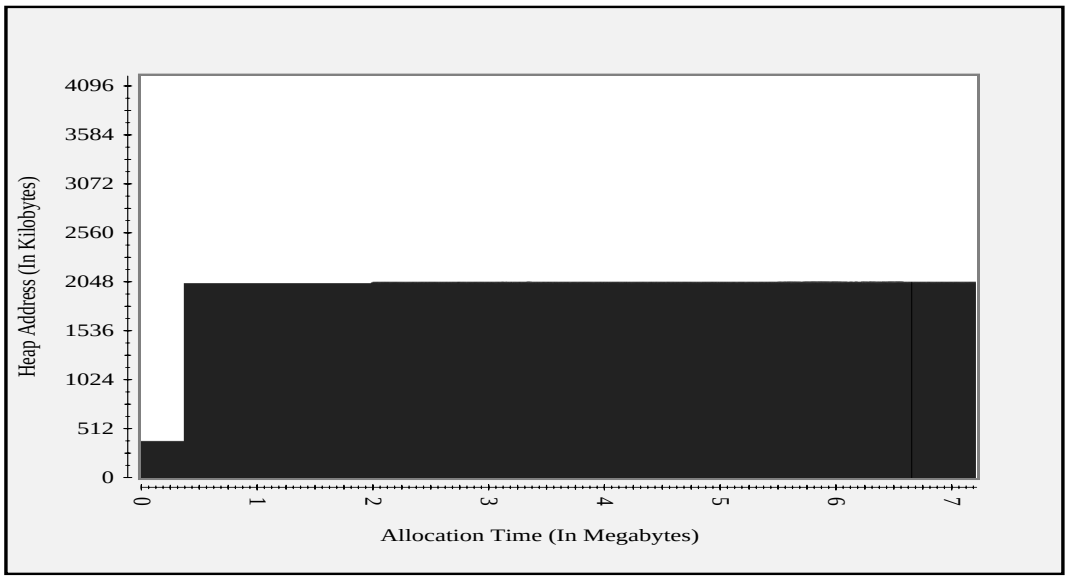

Figure C.44: Fragmentation plot for Hyper using the first-fit LIFO no-footer allocator (accounting for all overheads)

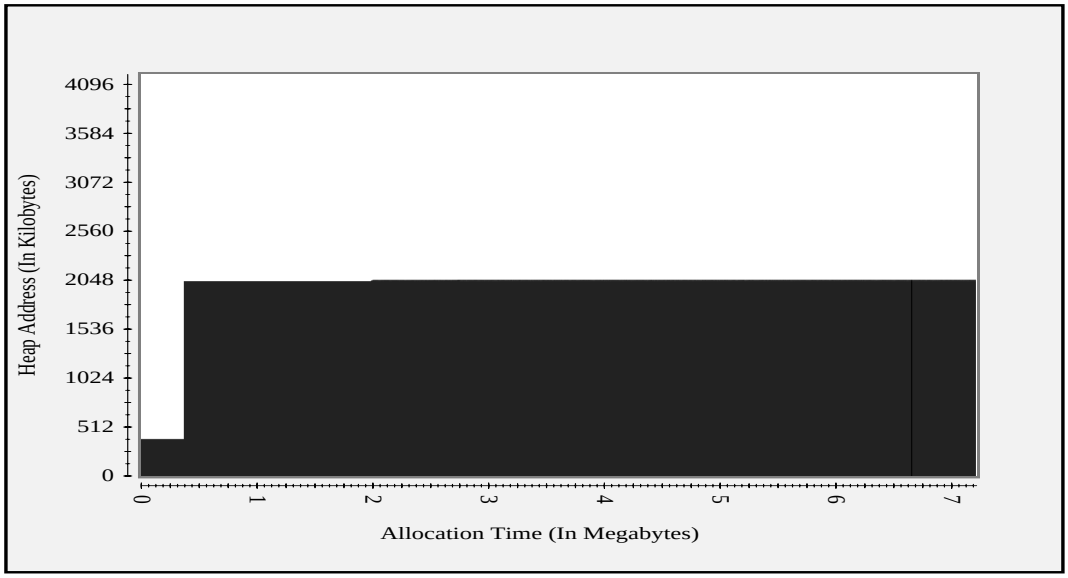

Figure C.45: Fragmentation plot for Hyper using the half-fit allocator (accounting for all overheads)

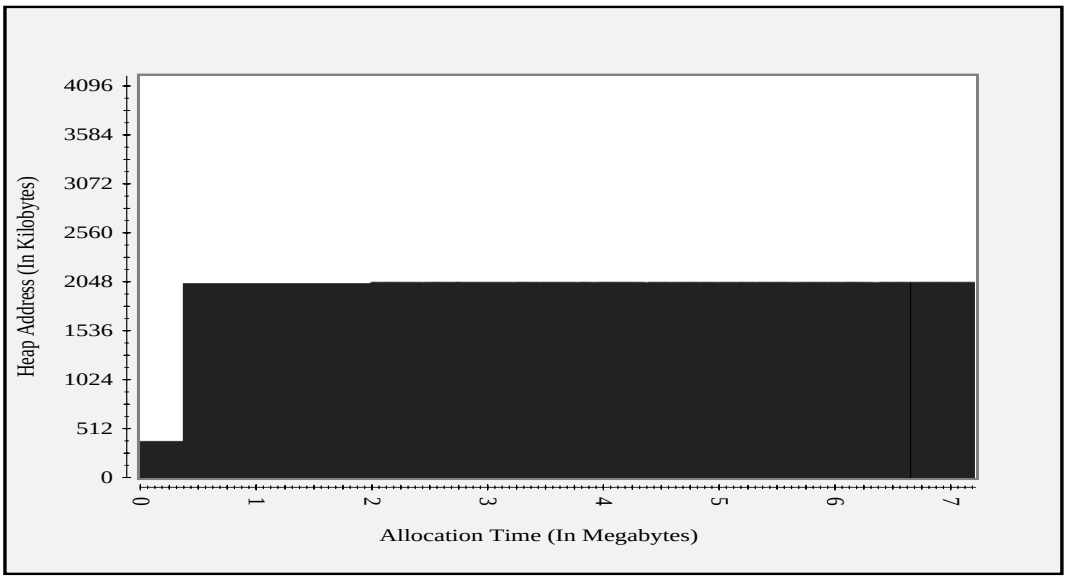

Figure C.46: Fragmentation plot for Hyper using Lea's 2.6.1 allocator (accounting for all overheads)

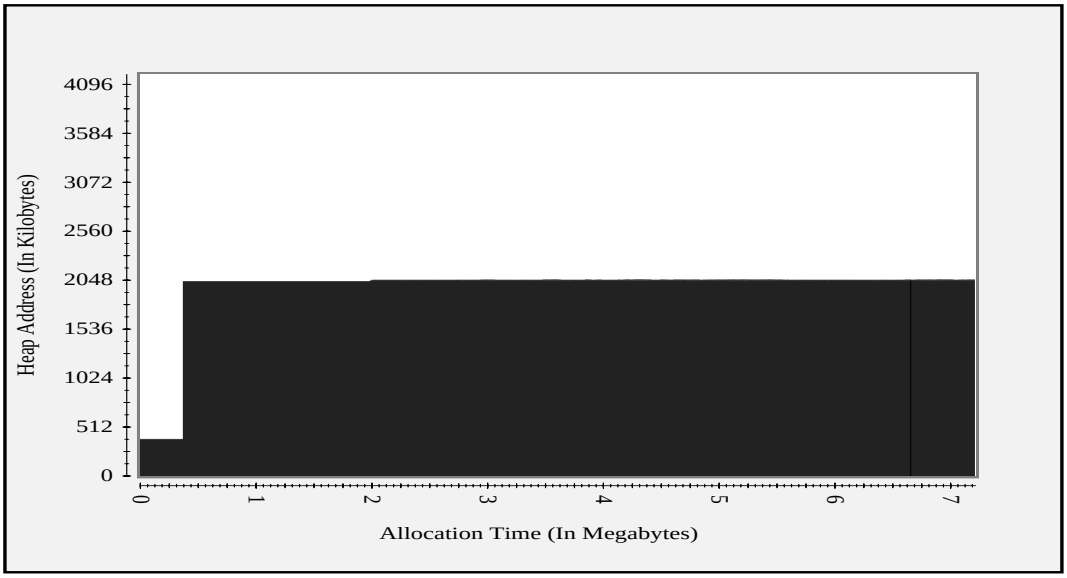

Figure C.47: Fragmentation plot for Hyper using the next-fit LIFO no-footer allocator (accounting for all overheads)

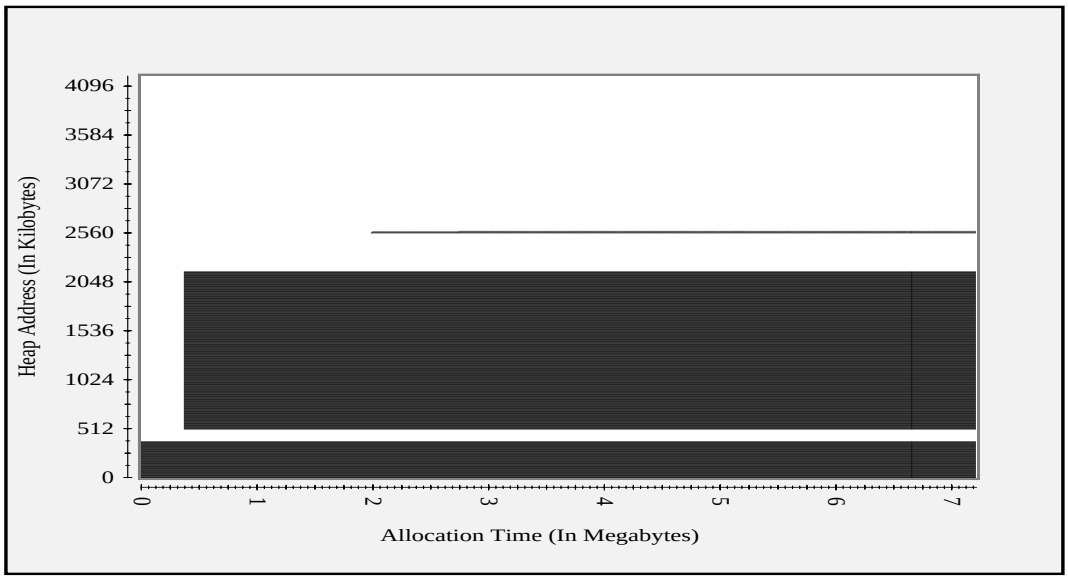

Figure C.48: Fragmentation plot for Hyper using the simple segregated storage 2^N allocator (accounting for all overheads)

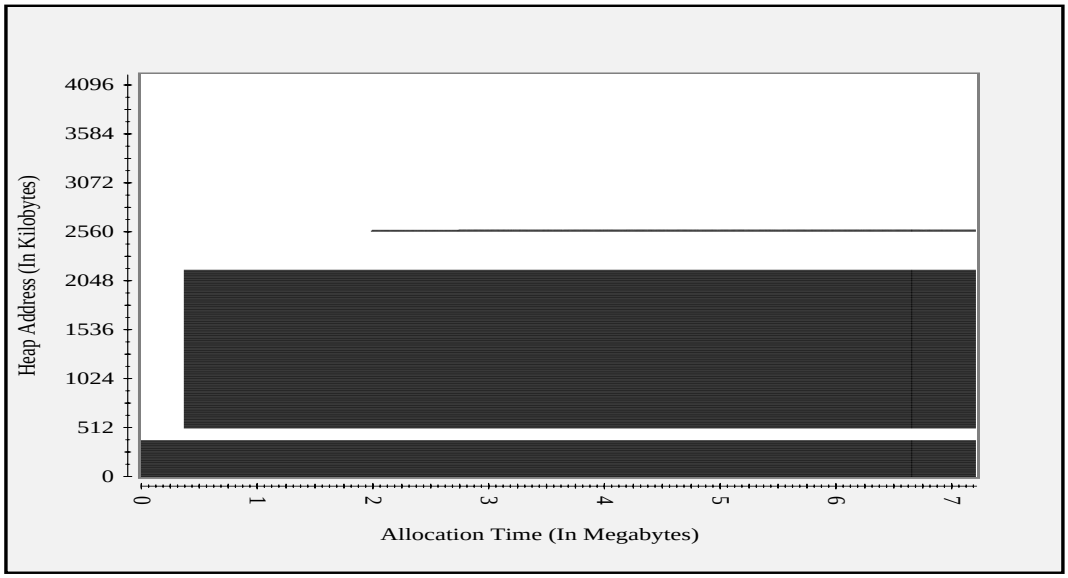

Figure C.49: Fragmentation plot for Hyper using the simple segregated storage 2^N & $3 * 2^N$ allocator (accounting for all overheads)

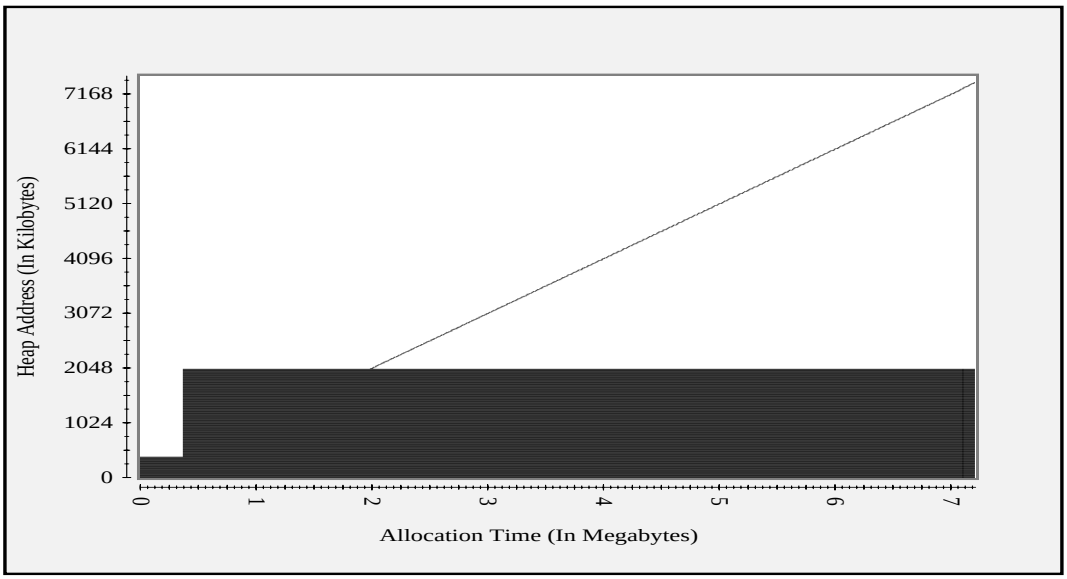

Figure C.50: Fragmentation plot for Hyper using the linear allocator

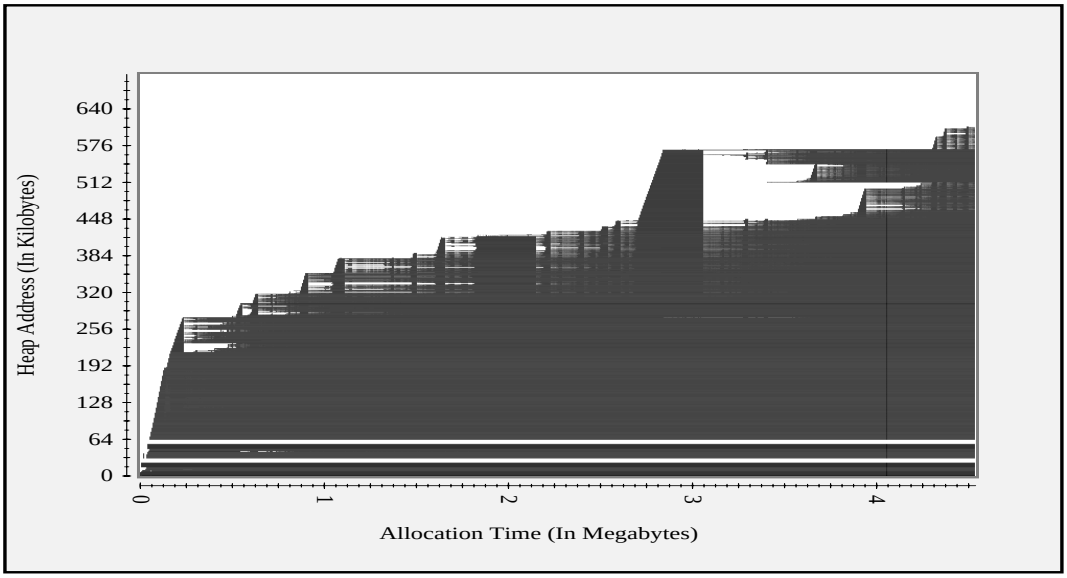

Figure C.51: Fragmentation plot for P2C using the binary-buddy allocator (accounting for all overheads)

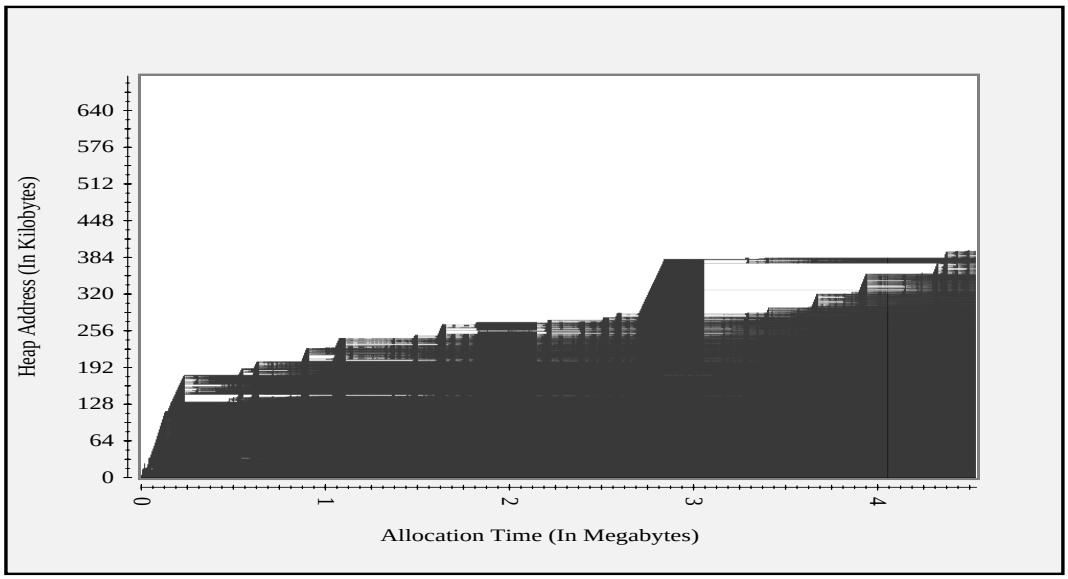

Figure C.52: Fragmentation plot for P2C using the best-fit LIFO no-footer allocator (accounting for all overheads)

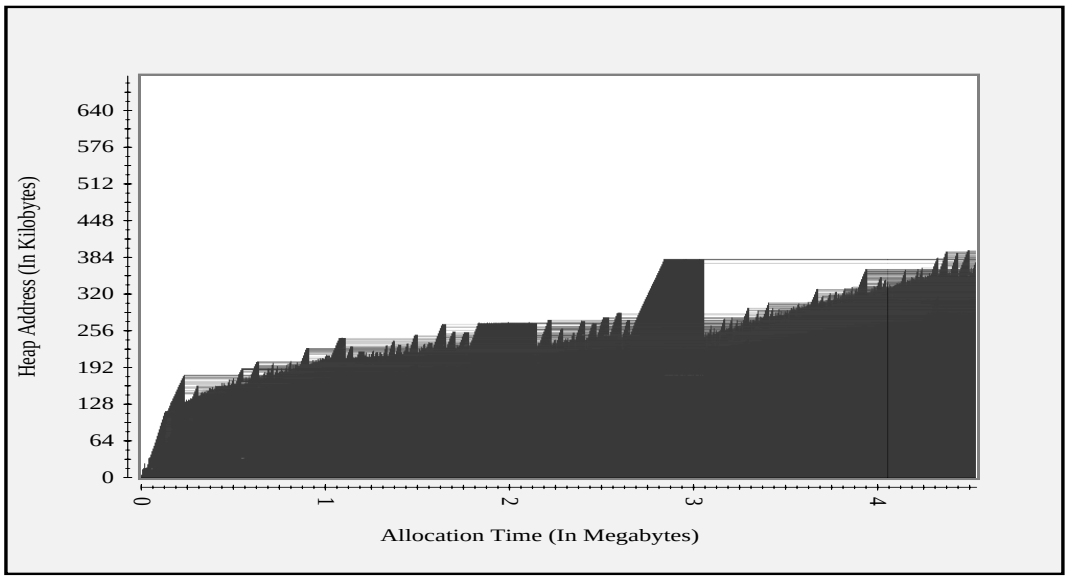

Figure C.53: Fragmentation plot for P2C using the first-fit address-ordered no-footer allocator (accounting for all overheads)

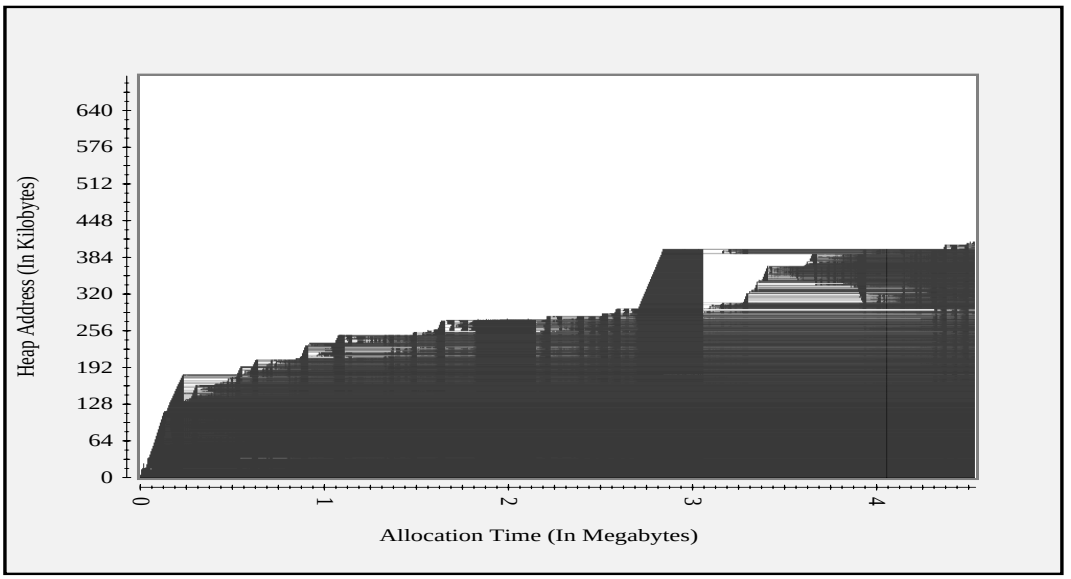

Figure C.54: Fragmentation plot for P2C using the first-fit LIFO no-footer allocator (accounting for all overheads)

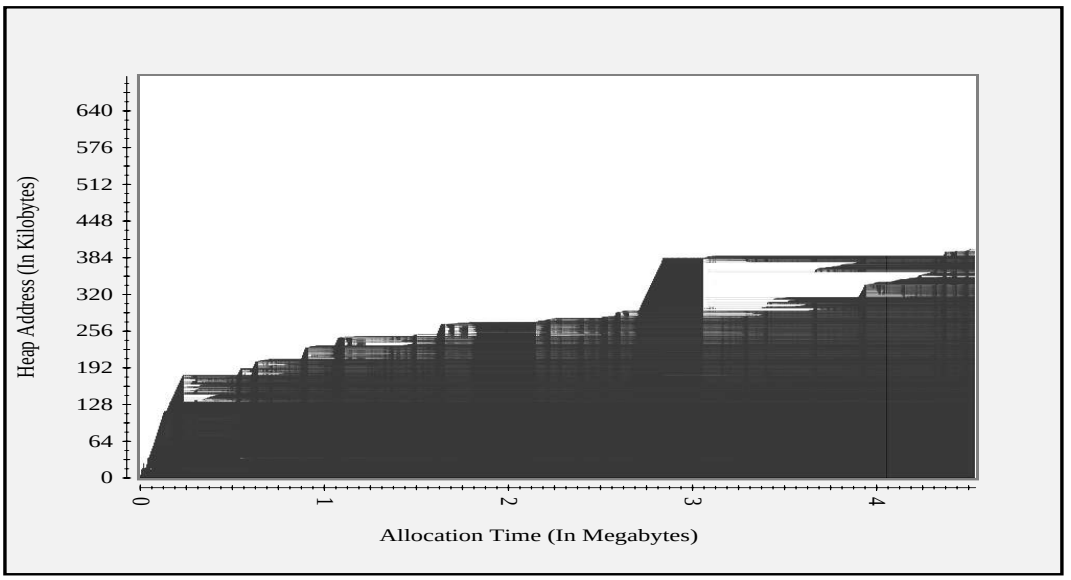

Figure C.55: Fragmentation plot for P2C using the half-fit allocator (accounting for all overheads)

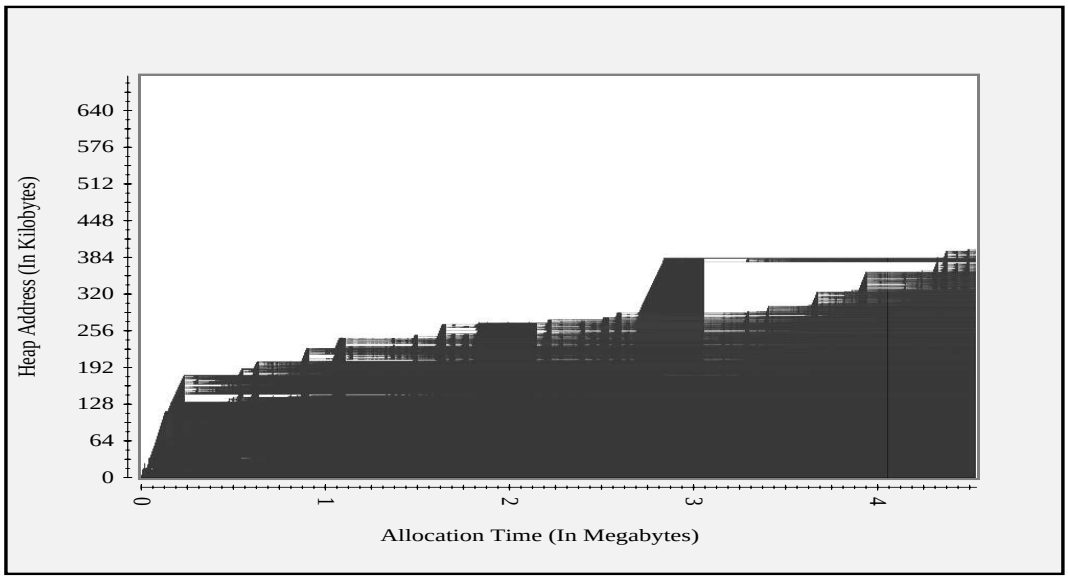

Figure C.56: Fragmentation plot for P2C using Lea's 2.6.1 allocator (accounting for all overheads)

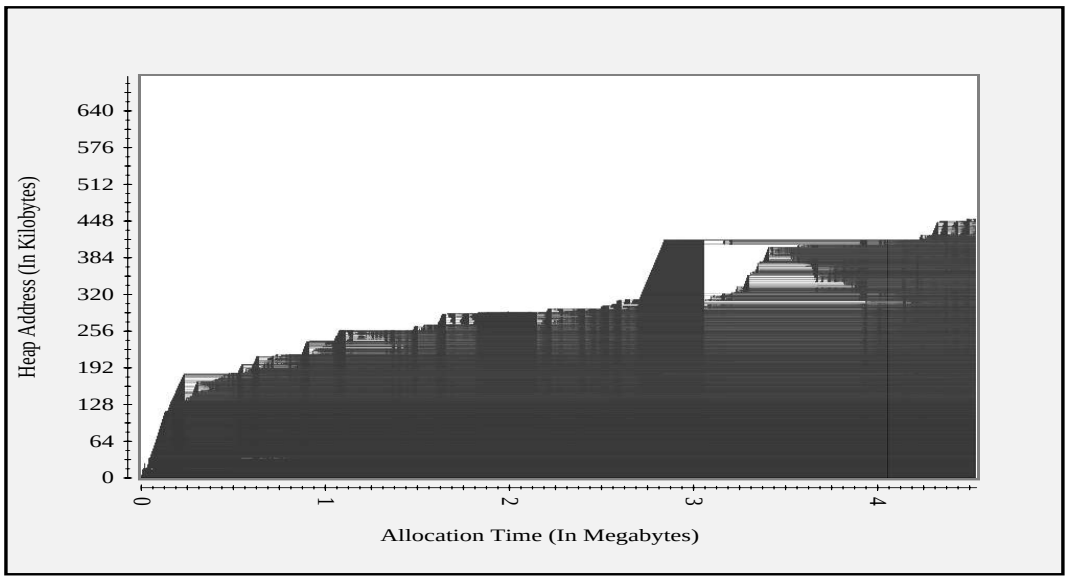

Figure C.57: Fragmentation plot for P2C using the next-fit LIFO no-footer allocator (accounting for all overheads)

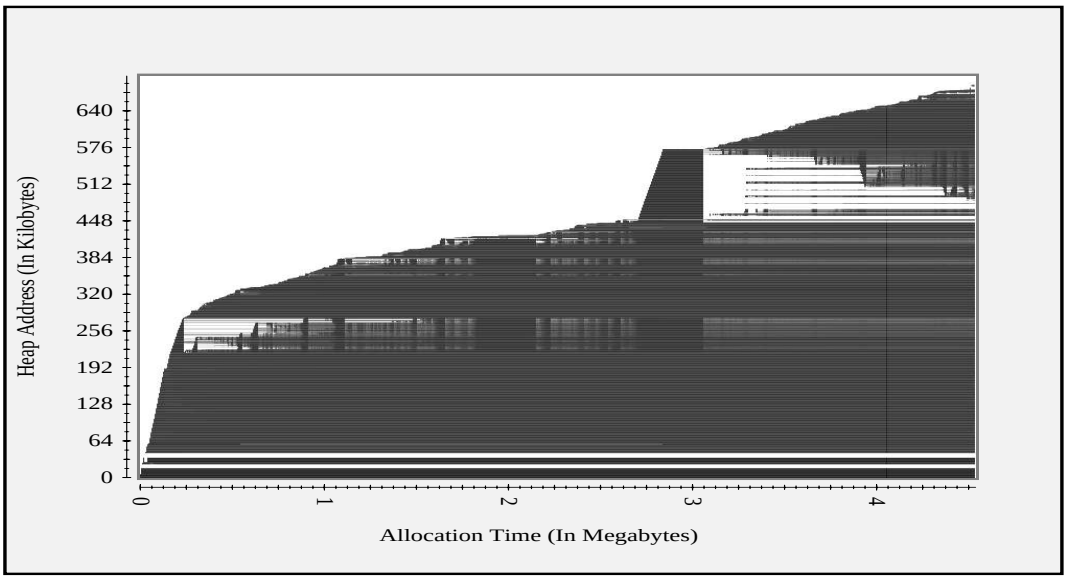

Figure C.58: Fragmentation plot for P2C using the simple segregated storage 2^N allocator (accounting for all overheads)

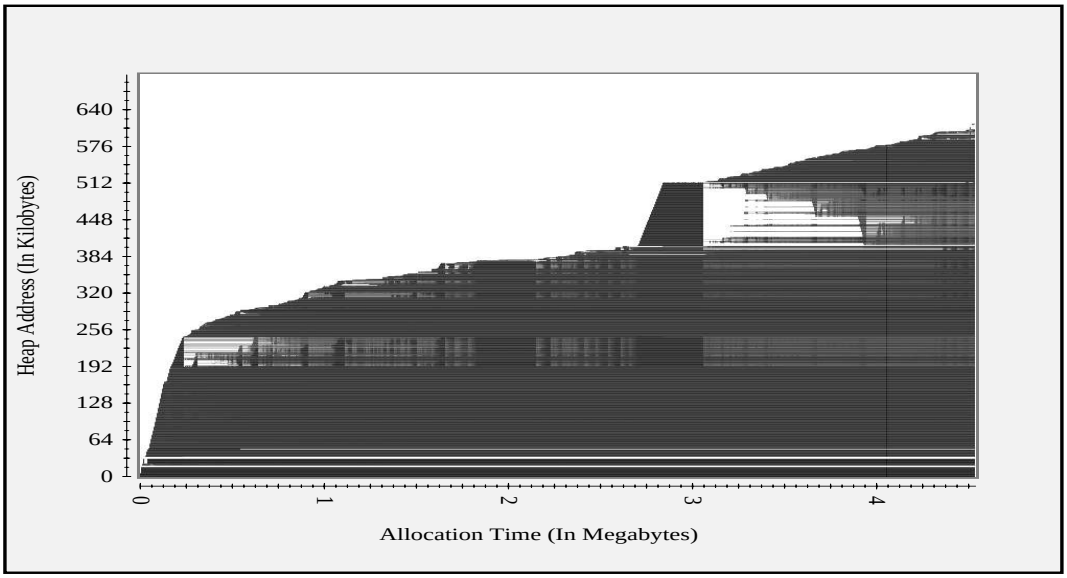

Figure C.59: Fragmentation plot for P2C using the simple segregated storage 2^N & $3 * 2^N$ allocator (accounting for all overheads)

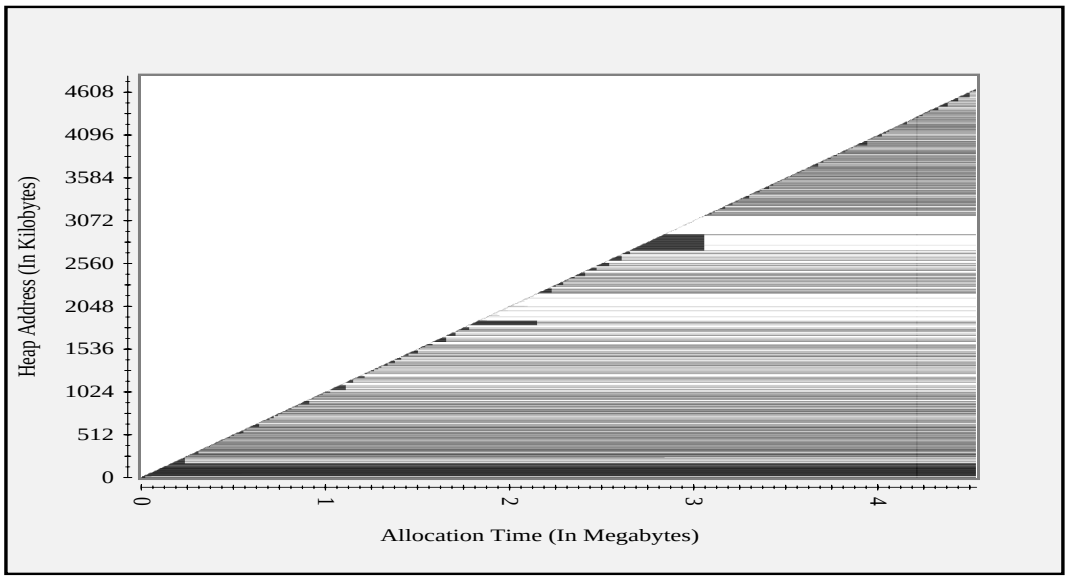

Figure C.60: Fragmentation plot for P2C using the linear allocator

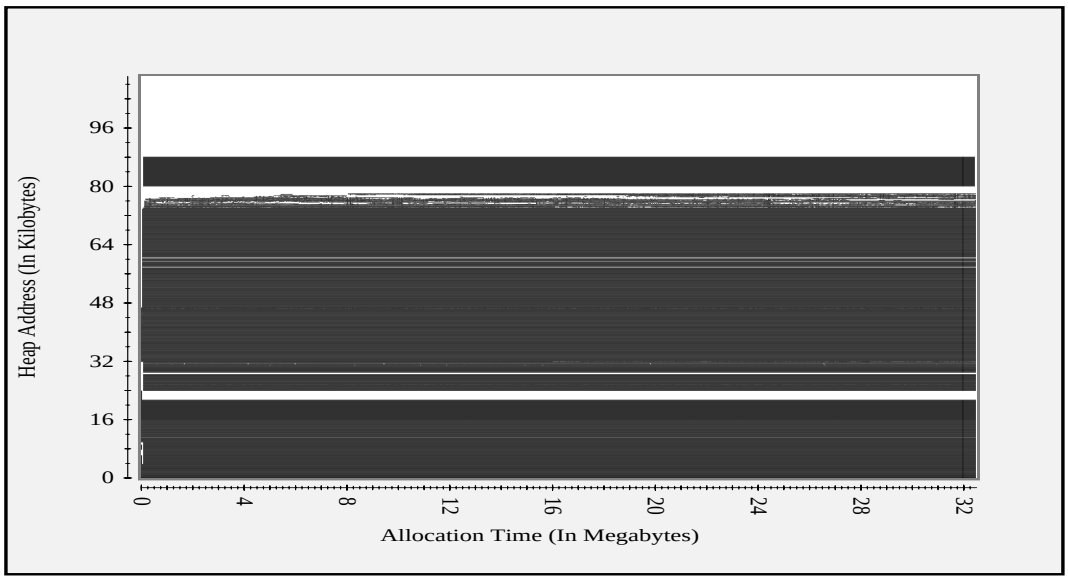

Figure C.61: Fragmentation plot for Perl using the binary-buddy allocator (accounting for all overheads)

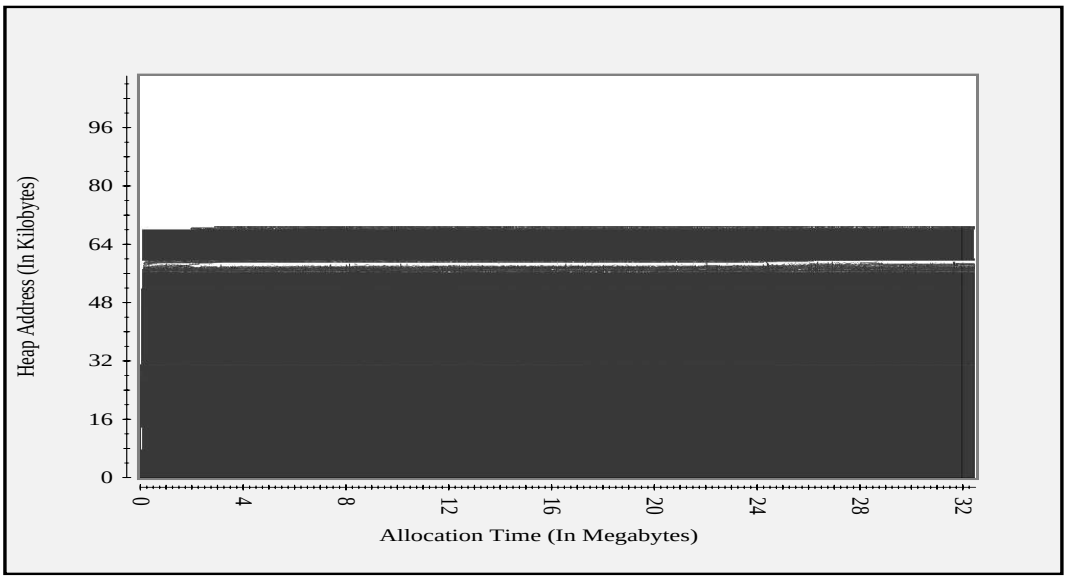

Figure C.62: Fragmentation plot for Perl using the best-fit LIFO no-footer allocator (accounting for all overheads)

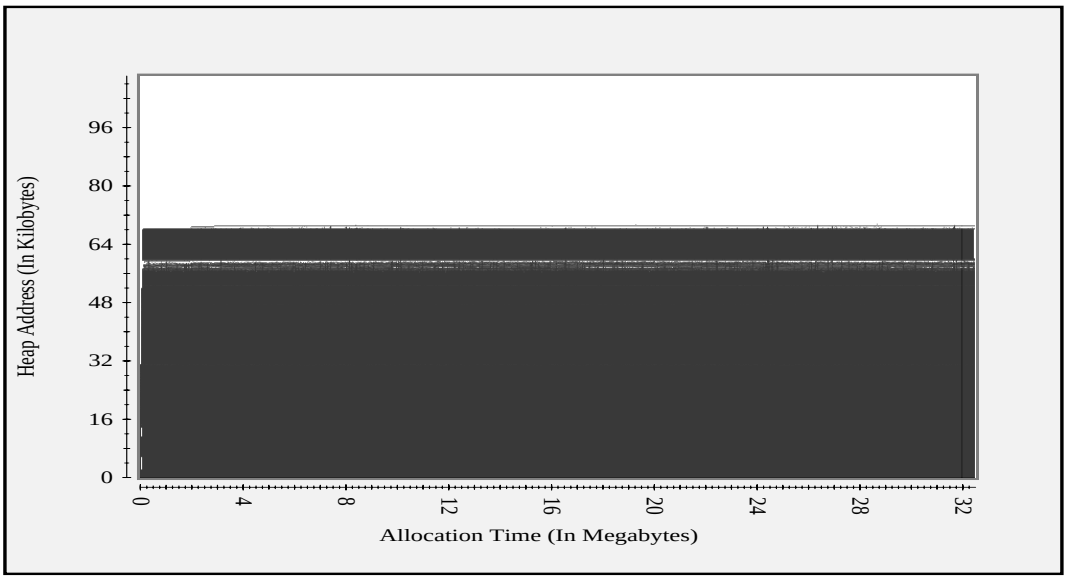

Figure C.63: Fragmentation plot for Perl using the first-fit address ordered no-footer allocator (accounting for all overheads)

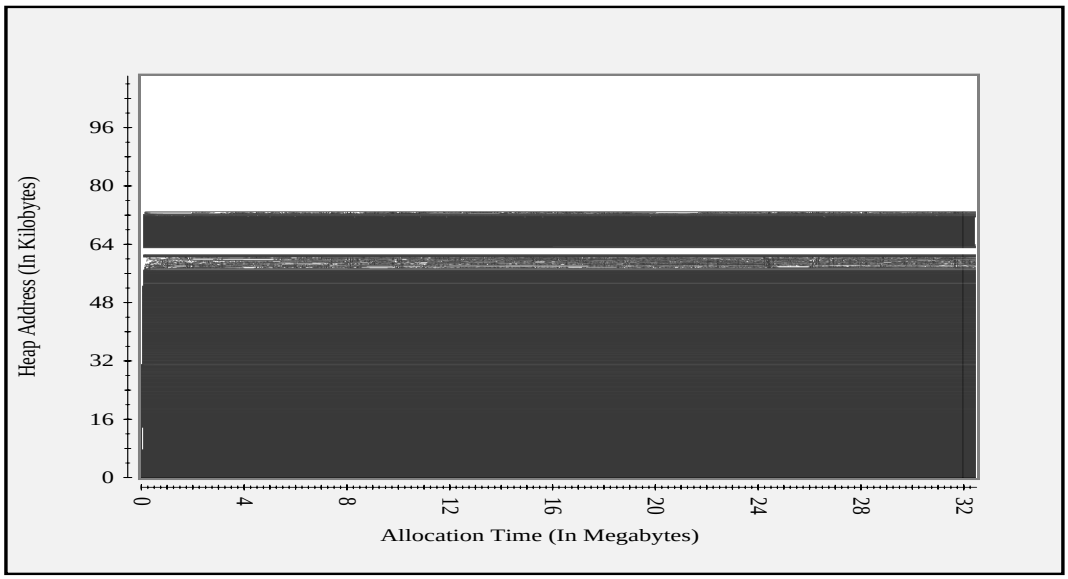

Figure C.64: Fragmentation plot for Perl using the first-fit LIFO no-footer allocator (accounting for all overheads)

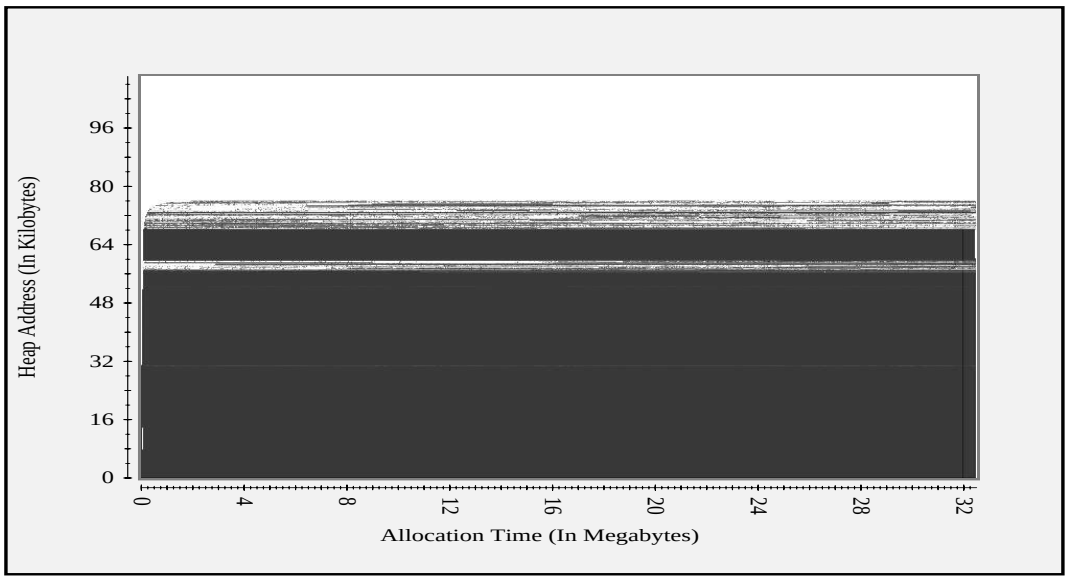

Figure C.65: Fragmentation plot for Perl using the half-fit allocator (accounting for all overheads)

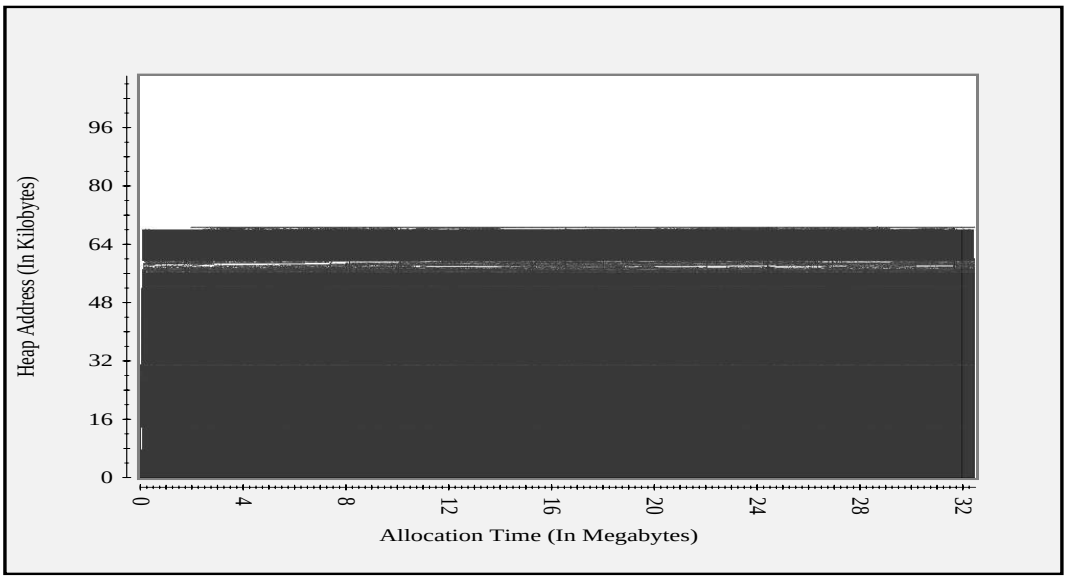

Figure C.66: Fragmentation plot for Perl using Lea's 2.6.1 allocator (accounting for all overheads)

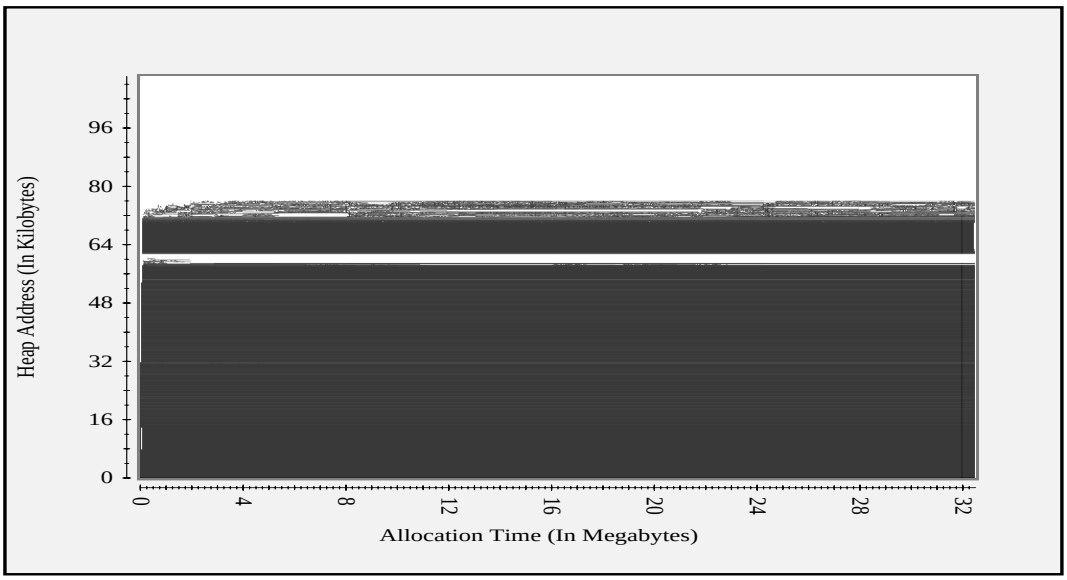

Figure C.67: Fragmentation plot for Perl using the next-fit LIFO no-footer allocator (accounting for all overheads)

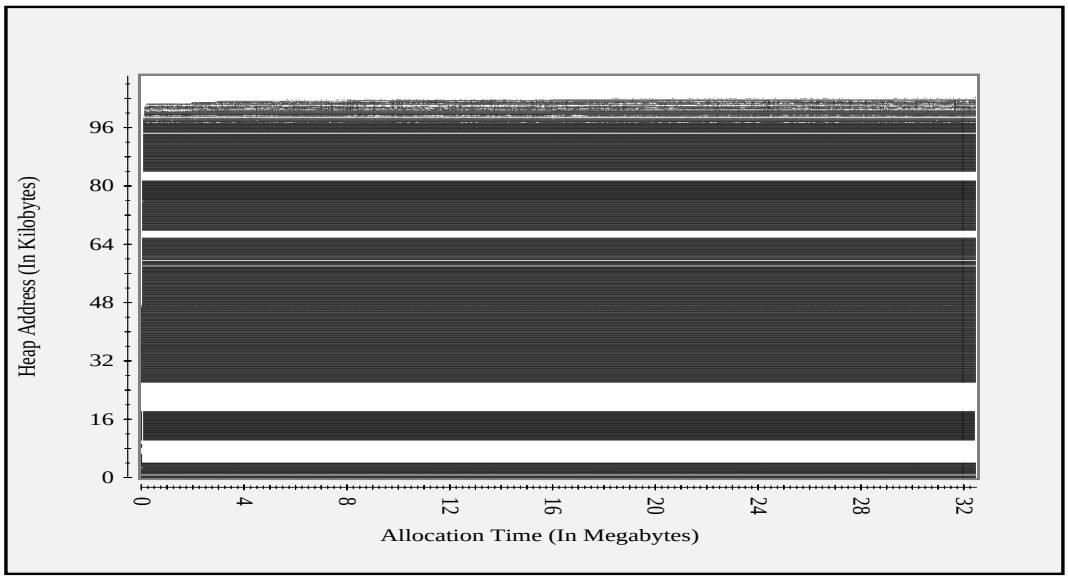

Figure C.68: Fragmentation plot for Perl using the simple segregated storage 2^N allocator (accounting for all overheads)

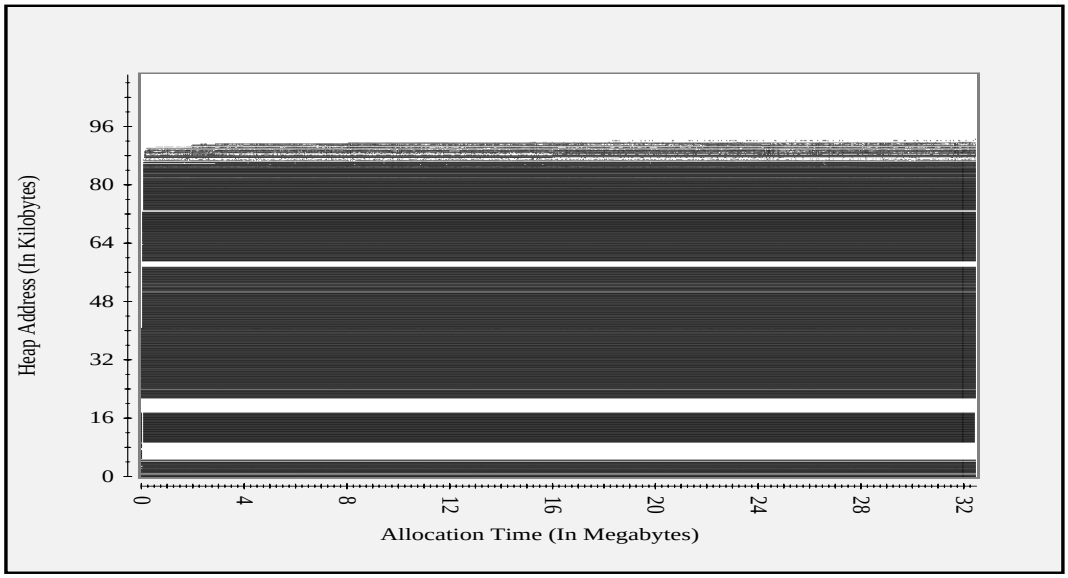

Figure C.69: Fragmentation plot for Perl using the simple segregated storage 2^N & $3 * 2^N$ allocator (accounting for all overheads)

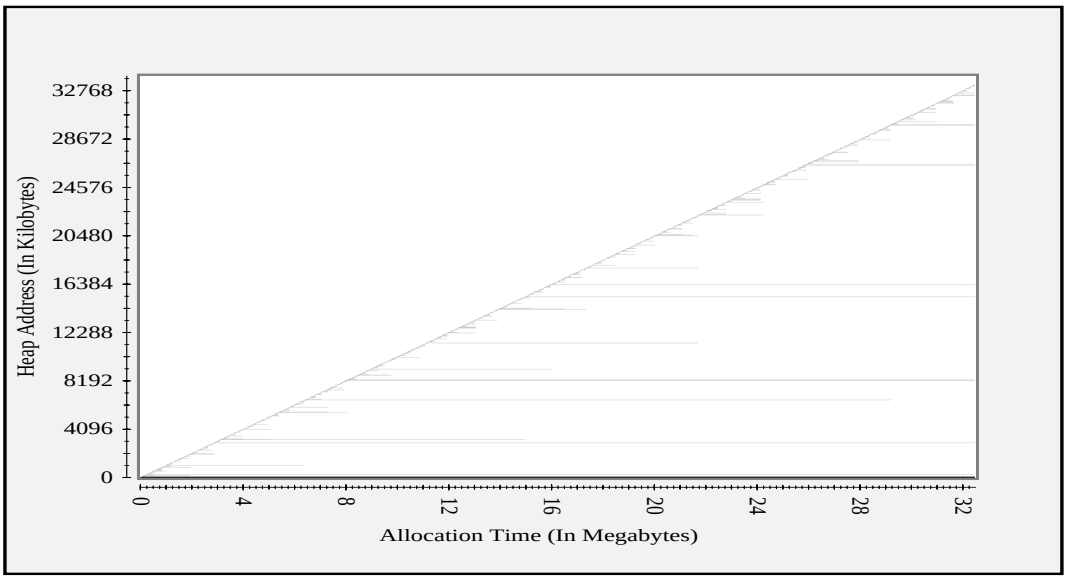

Figure C.70: Fragmentation plot for Perl using the linear allocator

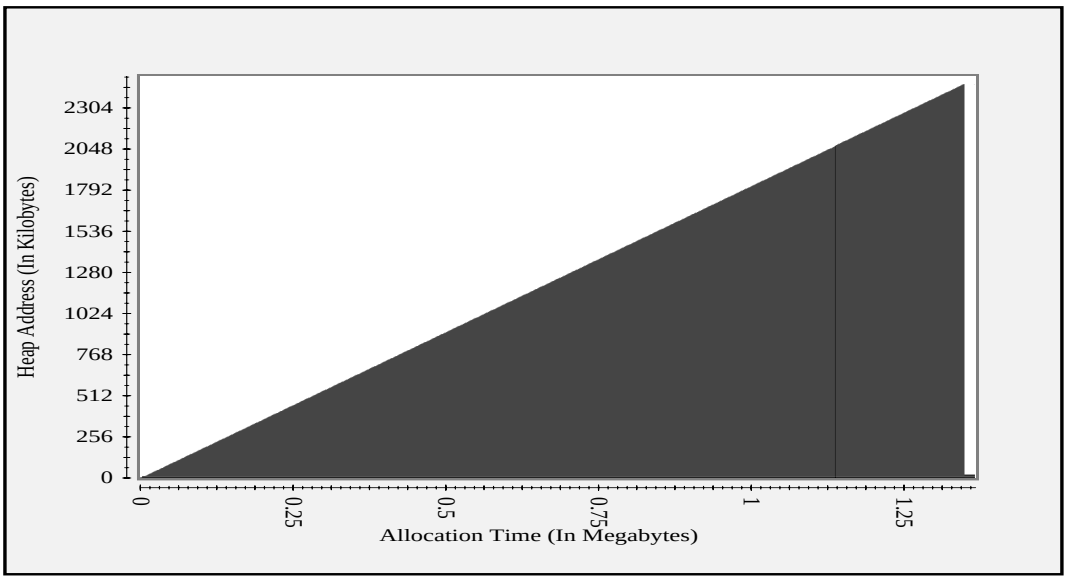

Figure C.71: Fragmentation plot for LRUsim using the binary-buddy allocator (accounting for all overheads)

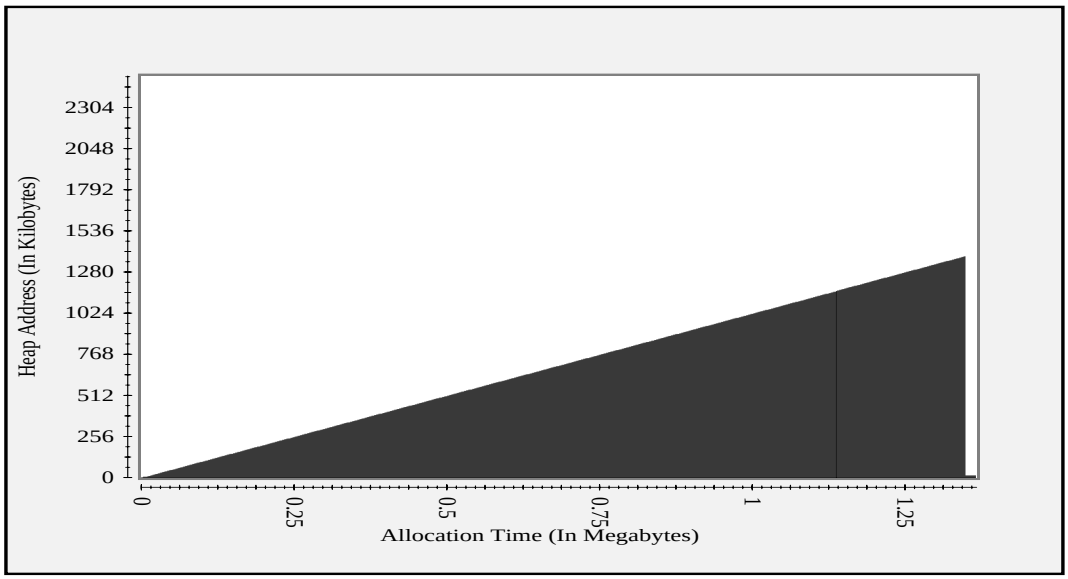

Figure C.72: Fragmentation plot for LRUsim using the best-fit LIFO no-footer allocator (accounting for all overheads)

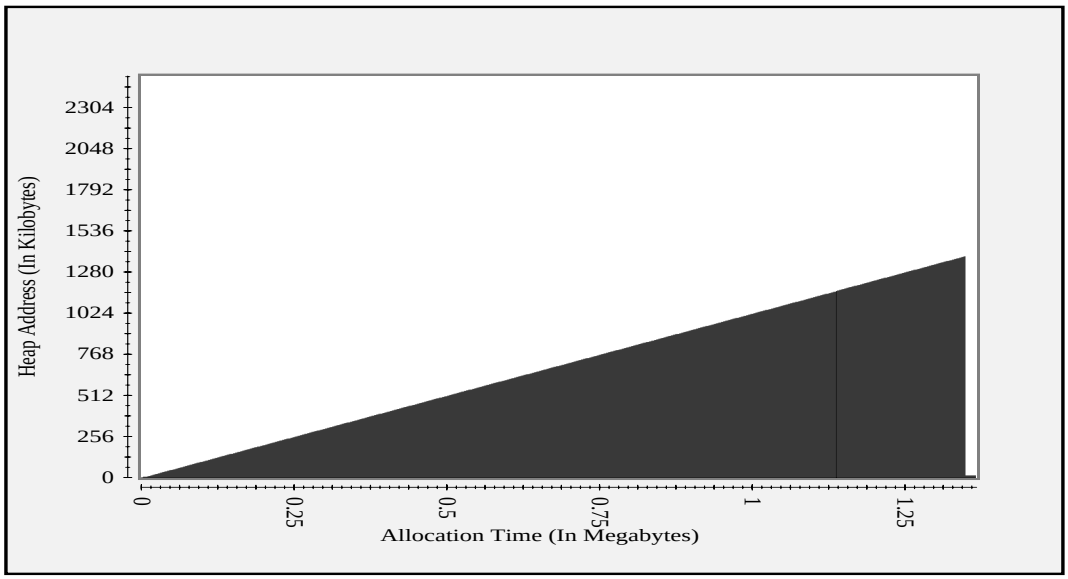

Figure C.73: Fragmentation plot for LRUsim using the first-fit address-ordered no-footer allocator (accounting for all overheads)

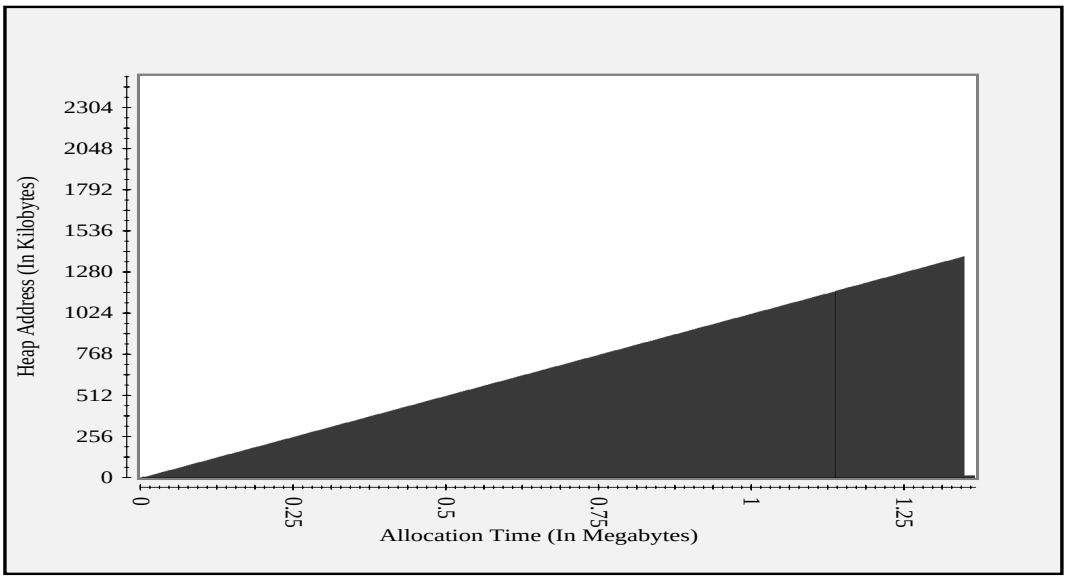

Figure C.74: Fragmentation plot for LRUsim using the first-fit LIFO no-footer allocator (accounting for all overheads)

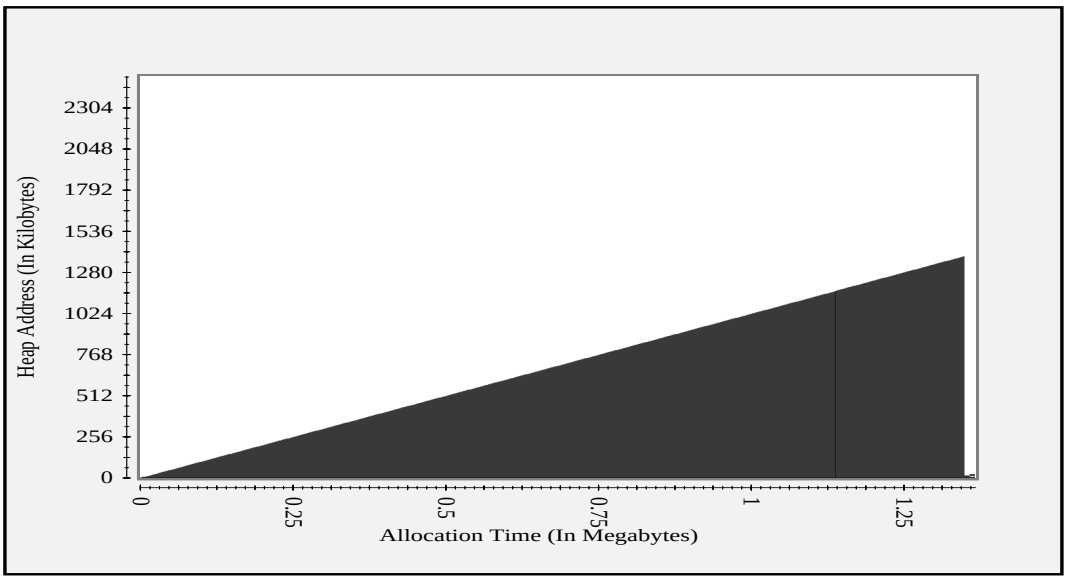

Figure C.75: Fragmentation plot for LRUsim using the half-fit allocator (accounting for all overheads)

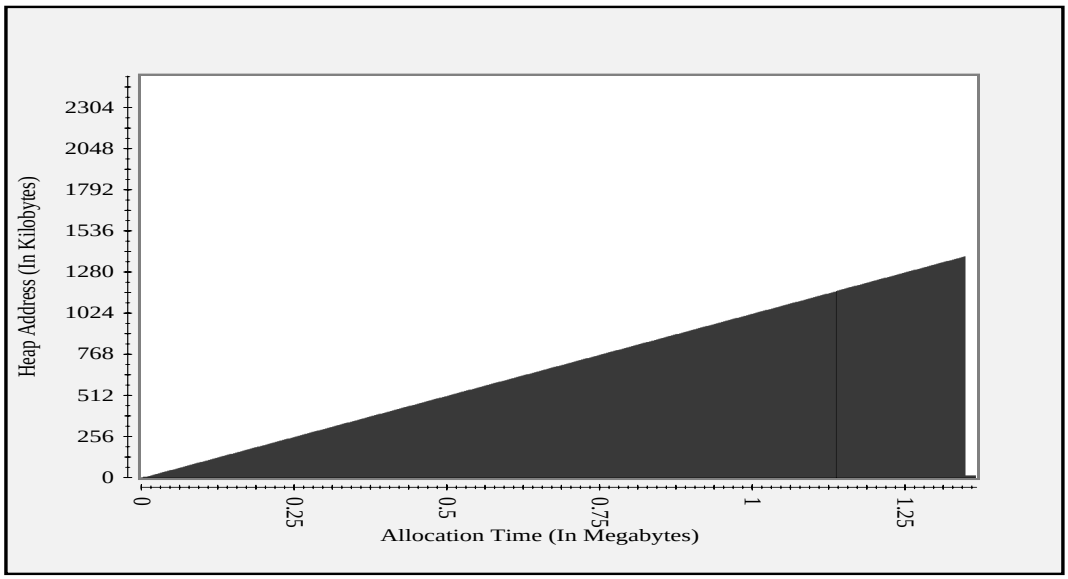

Figure C.76: Fragmentation plot for LRUsim using Lea's 2.6.1 allocator (accounting for all overheads)

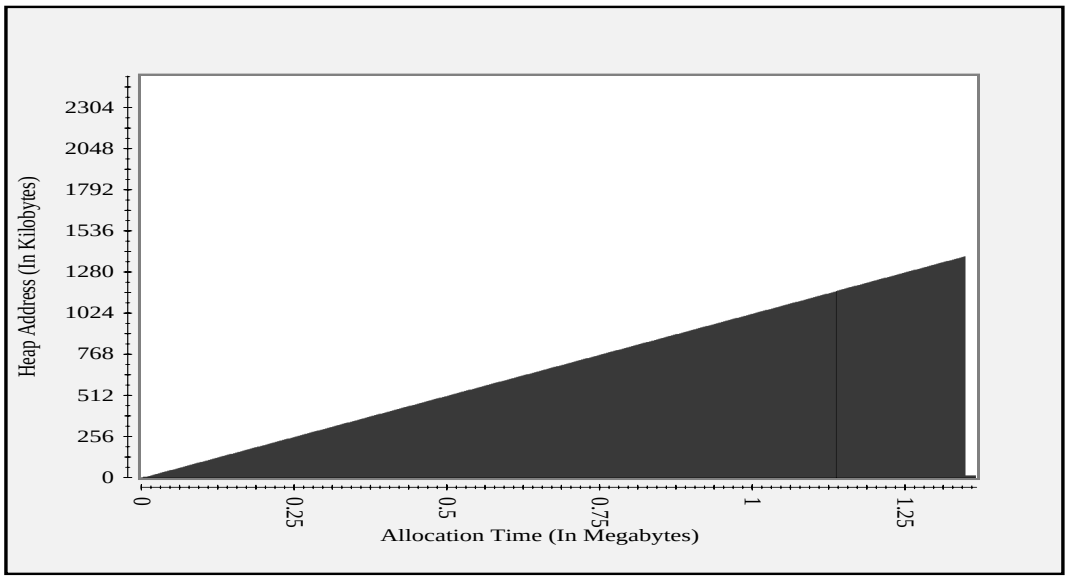

Figure C.77: Fragmentation plot for LRUsim using the next-fit LIFO no-footer allocator (accounting for all overheads)

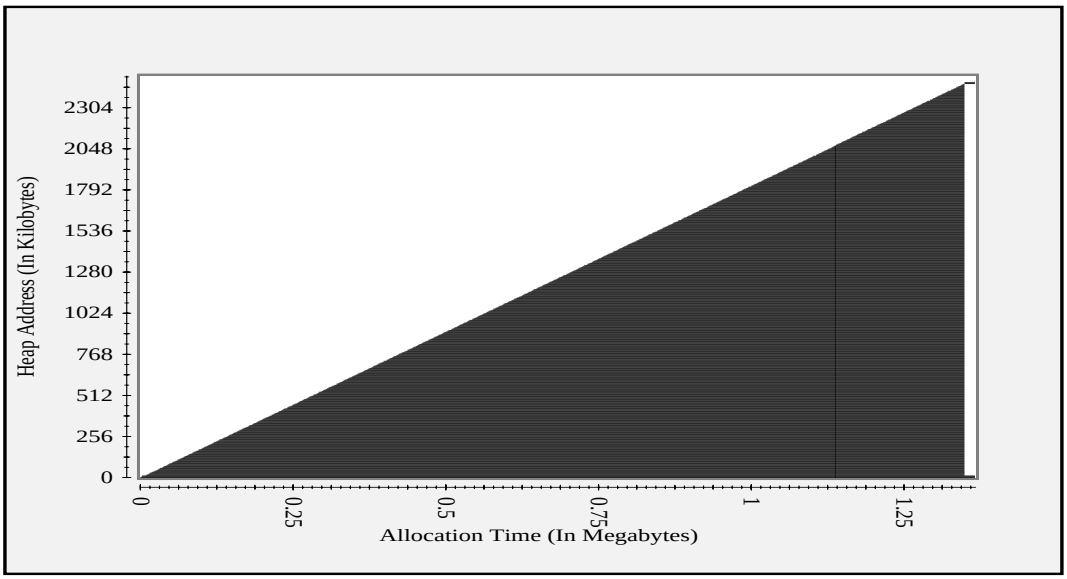

Figure C.78: Fragmentation plot for LRUsim using the simple segregated storage 2^N allocator (accounting for all overheads)

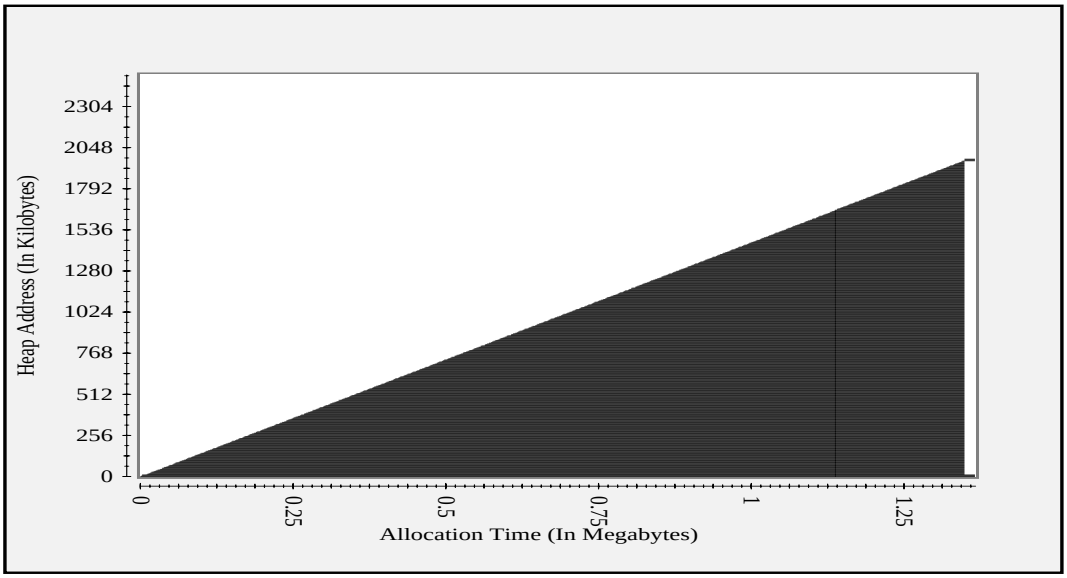

Figure C.79: Fragmentation plot for LRUsim using the simple segregated storage 2^N & $3*2^N$ allocator (accounting for all overheads)

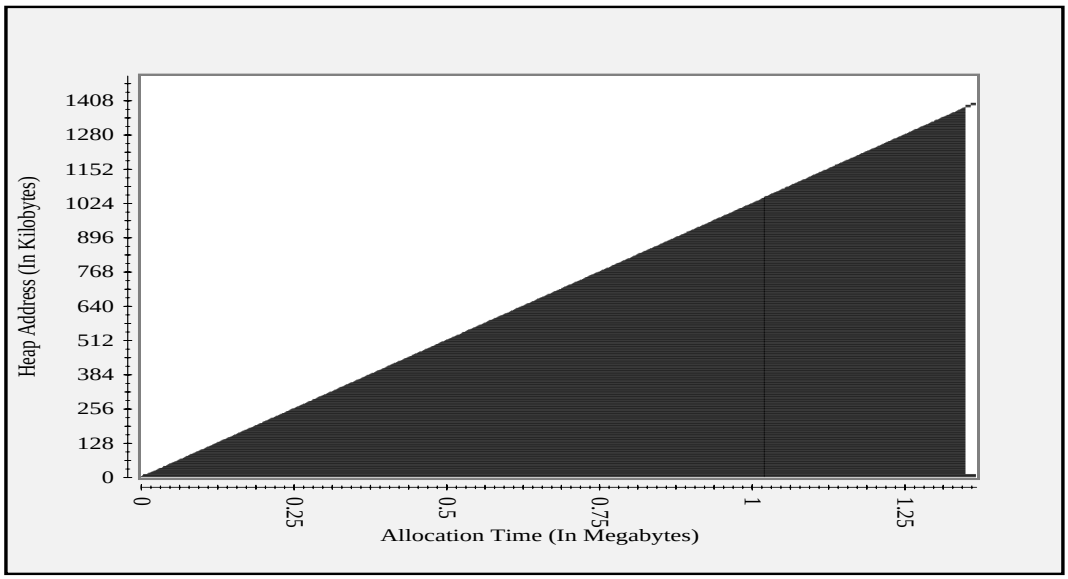

Figure C.80: Fragmentation plot for LRUsim using the linear allocator

Appendix D

Shuffled Heap Plots

The pictures that follow are fragmentation plots of the form first shown in Section 2.15.1. These pictures show the heap use for actual implementation of various selected allocators across time compared to the heap usage of the same allocator with a shuffled version of that trace. Note how strikingly different many of the pictures look. As was described in Section 2.14, darker pixels indicate a larger percentage of memory in use.

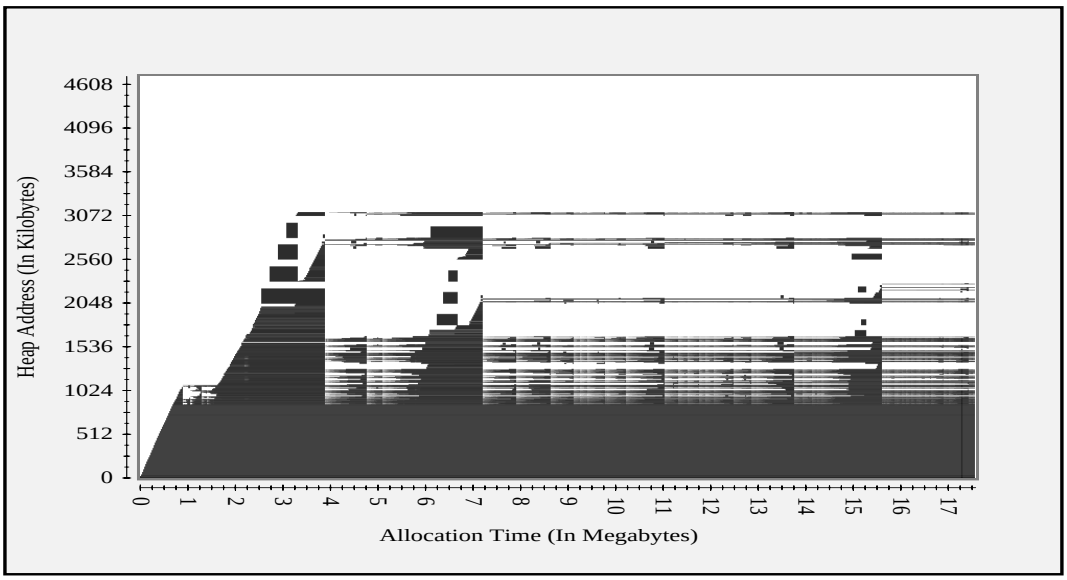

Figure D.1: Fragmentation plot for GCC using the binary-buddy allocator (accounting for all overheads)

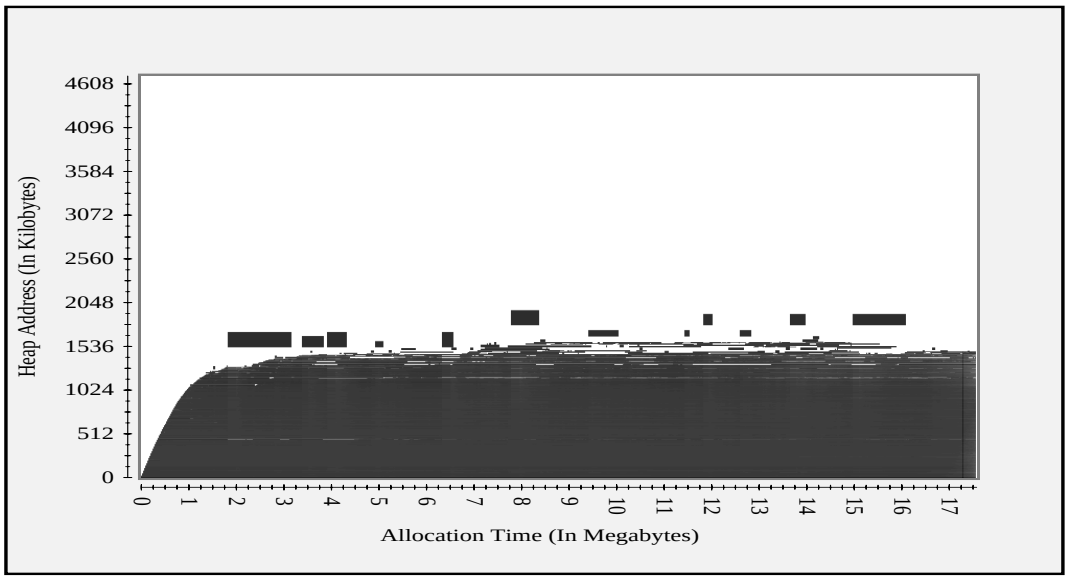

Figure D.2: Fragmentation plot for GCC *shuffled* using the binary-buddy allocator (accounting for all overheads)

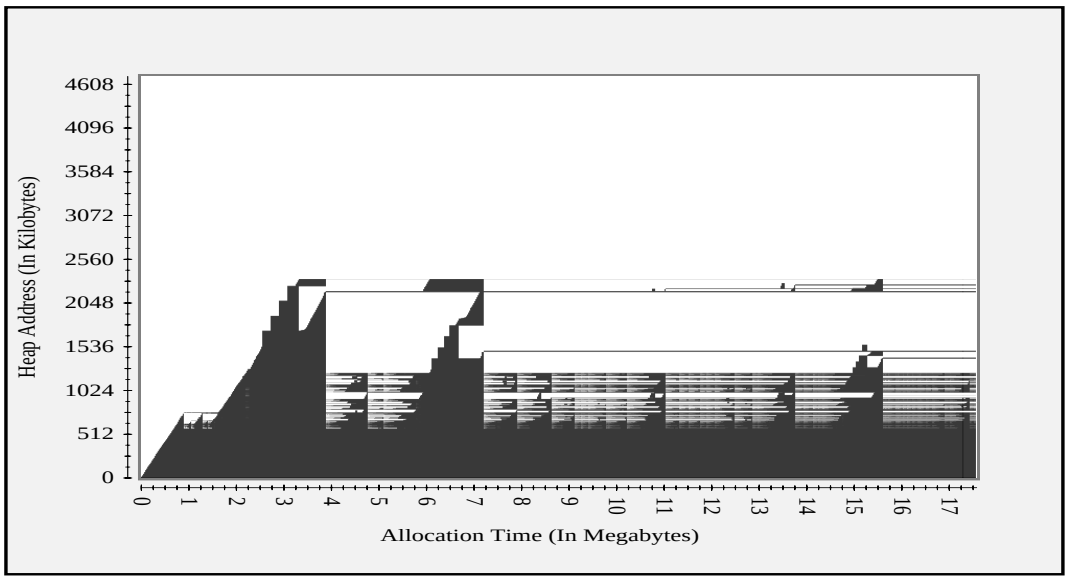

Figure D.3: Fragmentation plot for GCC using the best-fit LIFO no-footer allocator (accounting for all overheads)

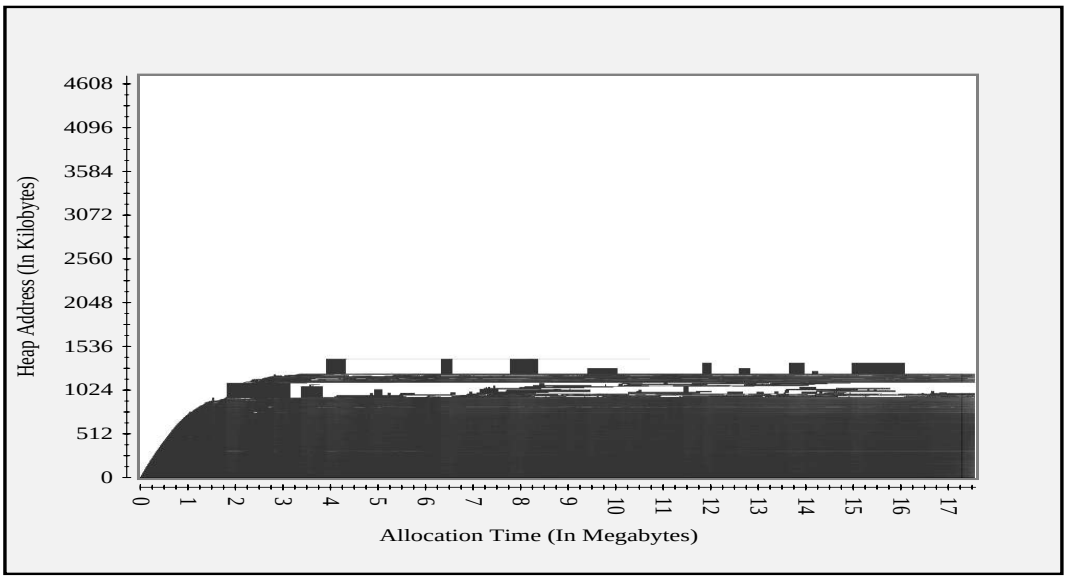

Figure D.4: Fragmentation plot for GCC *shuffled* using the best-fit LIFO no-footer allocator (accounting for all overheads)

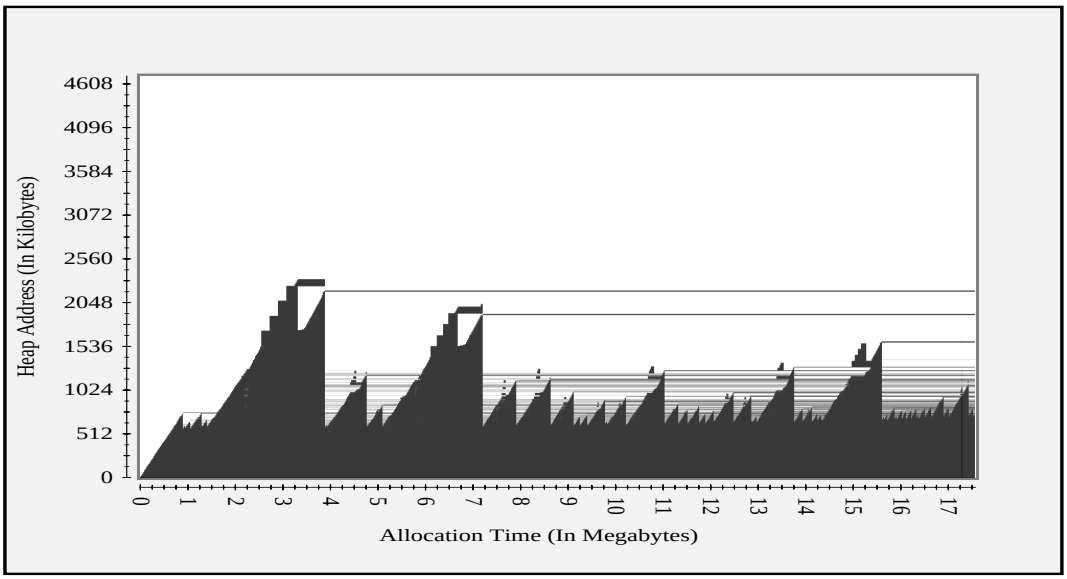

Figure D.5: Fragmentation plot for GCC using the first-fit address-ordered no-footer allocator (accounting for all overheads)

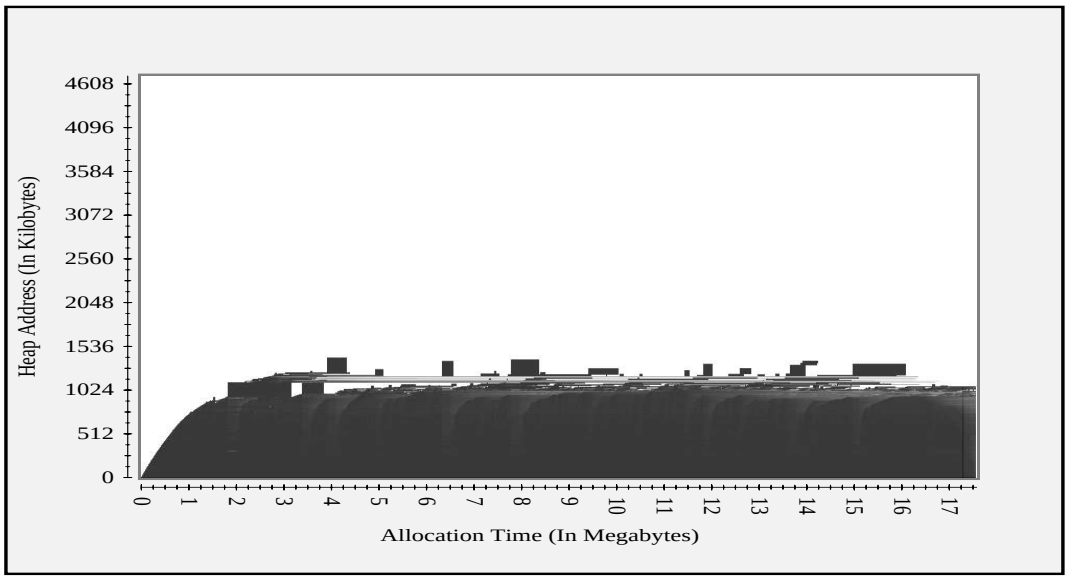

Figure D.6: Fragmentation plot for GCC *shuffled* using the first-fit address-ordered no-footer allocator (accounting for all overheads)

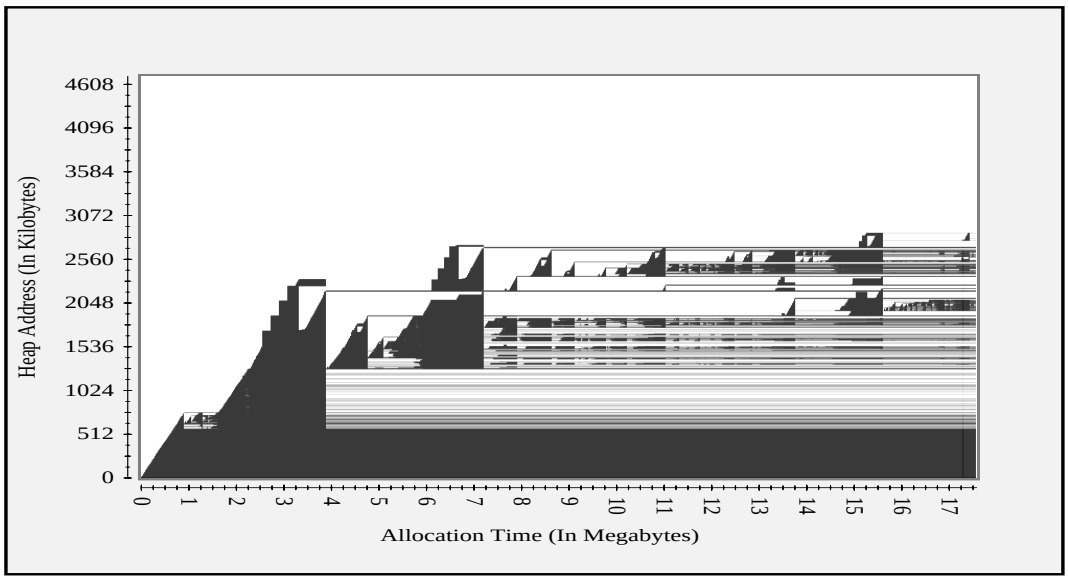

Figure D.7: Fragmentation plot for GCC using the first-fit LIFO no-footer allocator (accounting for all overheads)

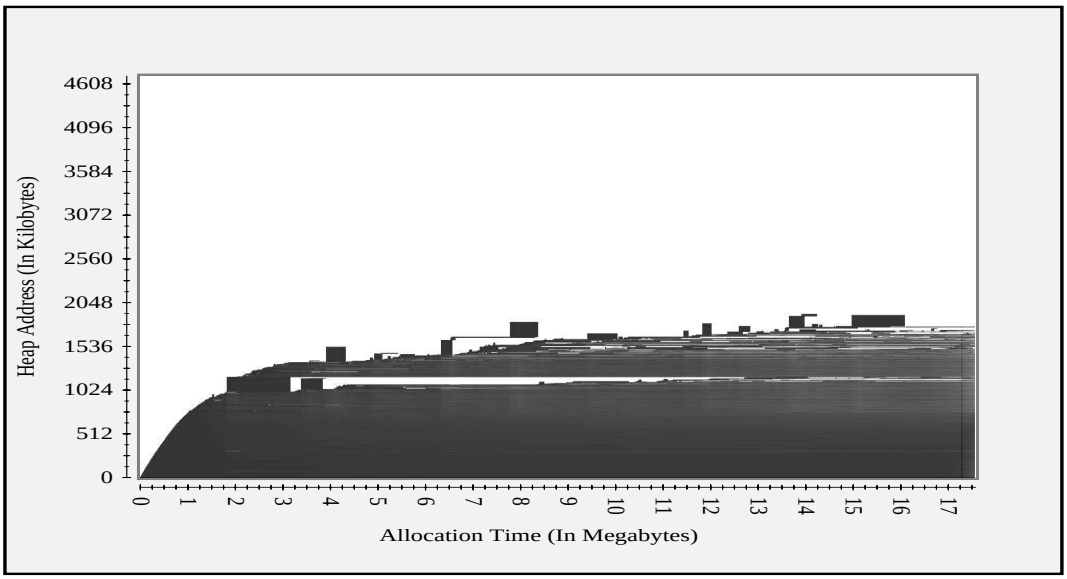

Figure D.8: Fragmentation plot for GCC *shuffled* using the first-fit LIFO no-footer allocator (accounting for all overheads)

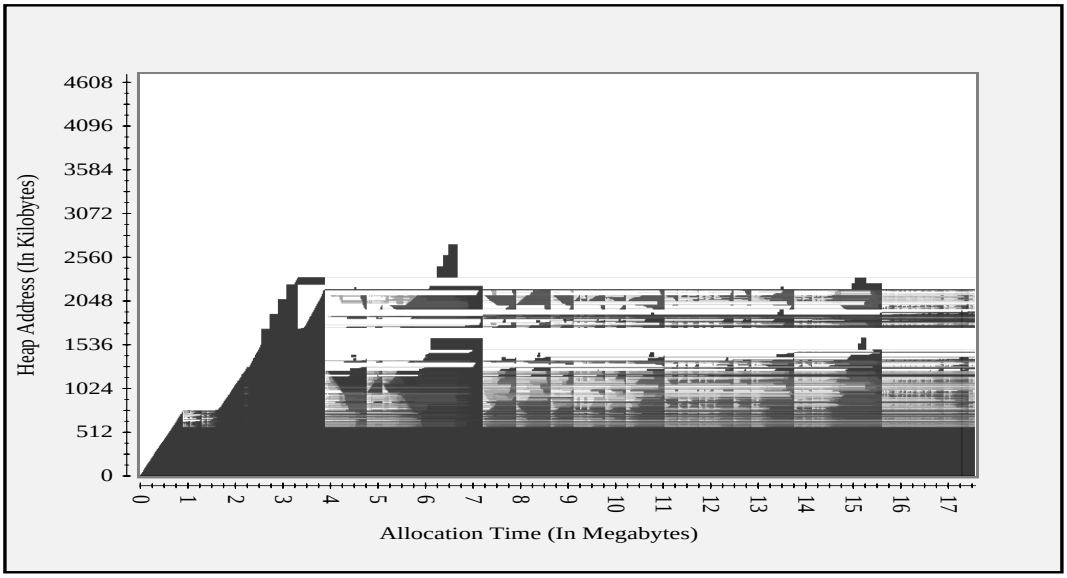

Figure D.9: Fragmentation plot for GCC using the half-fit allocator (accounting for all overheads)

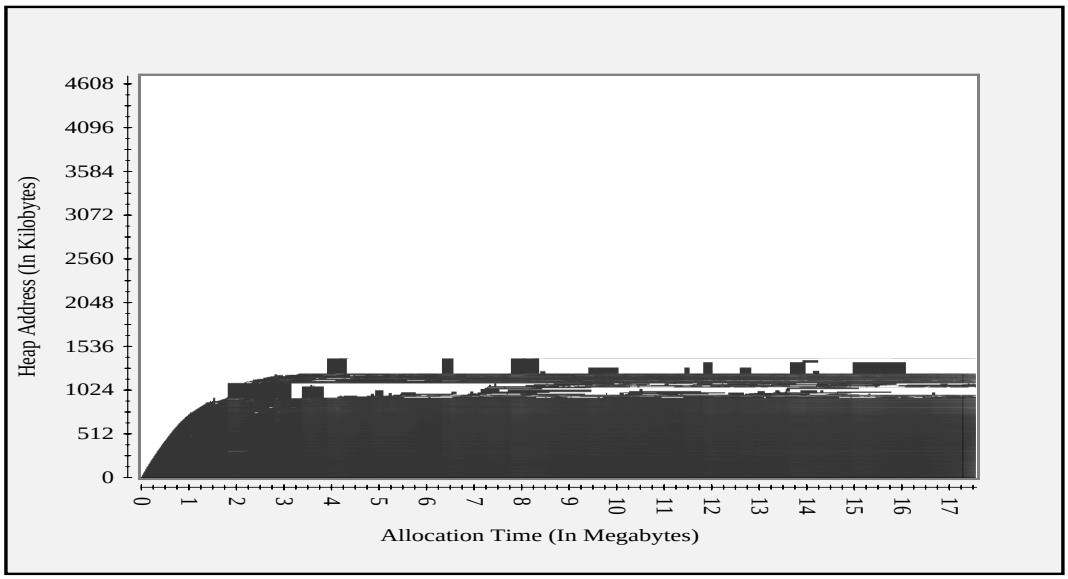

Figure D.10: Fragmentation plot for GCC *shuffled* using the half-fit allocator (accounting for all overheads)

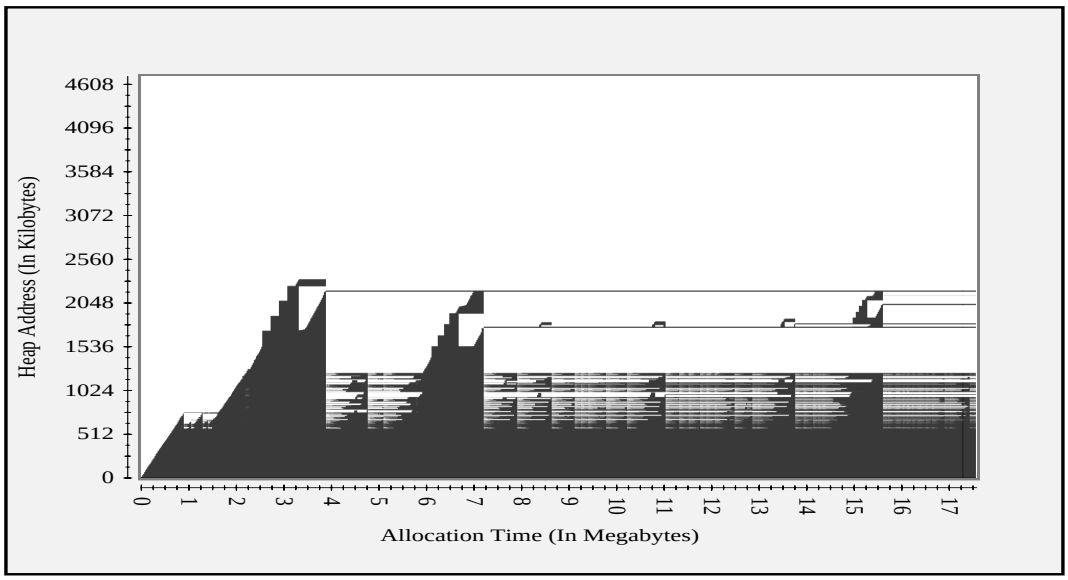

Figure D.11: Fragmentation plot for GCC using Lea's 2.6.1 allocator (accounting for all overheads)

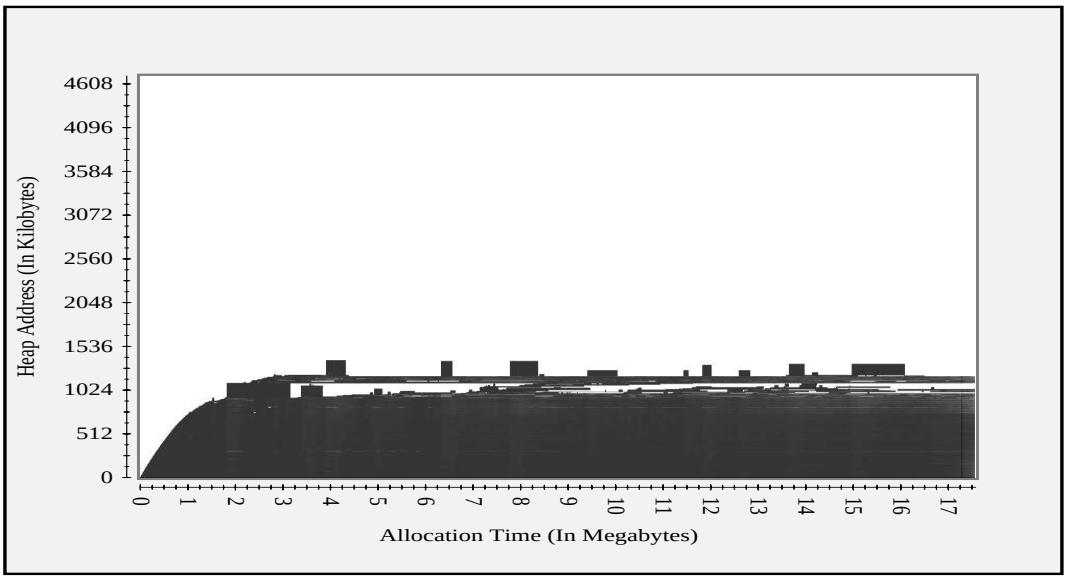

Figure D.12: Fragmentation plot for GCC *shuffled* using Lea's allocator (accounting for all overheads)

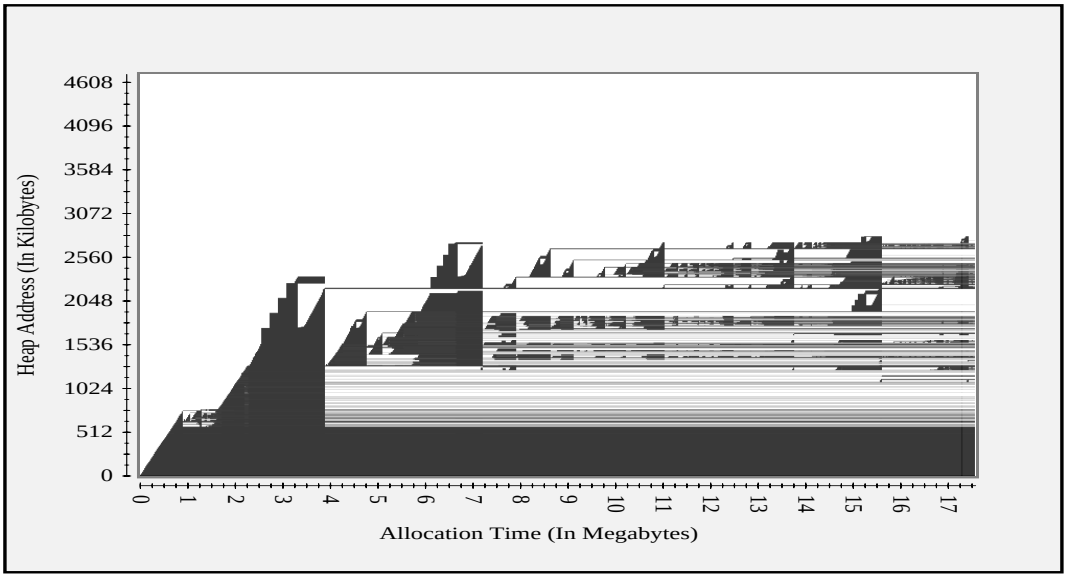

Figure D.13: Fragmentation plot for GCC using the next-fit LIFO no-footer allocator (accounting for all overheads)

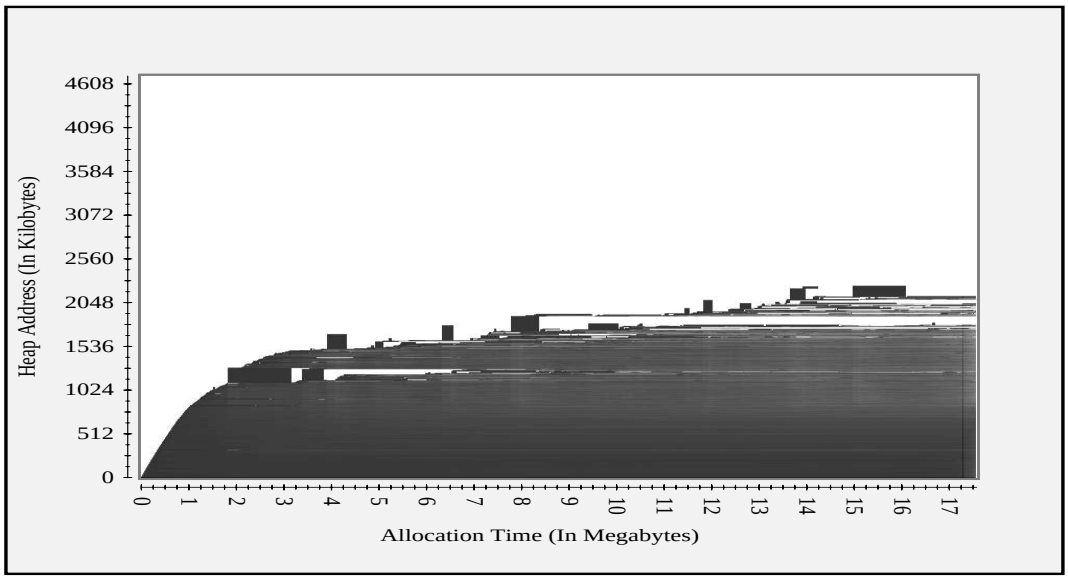

Figure D.14: Fragmentation plot for GCC *shuffled* using the next-fit LIFO no-footer allocator (accounting for all overheads)

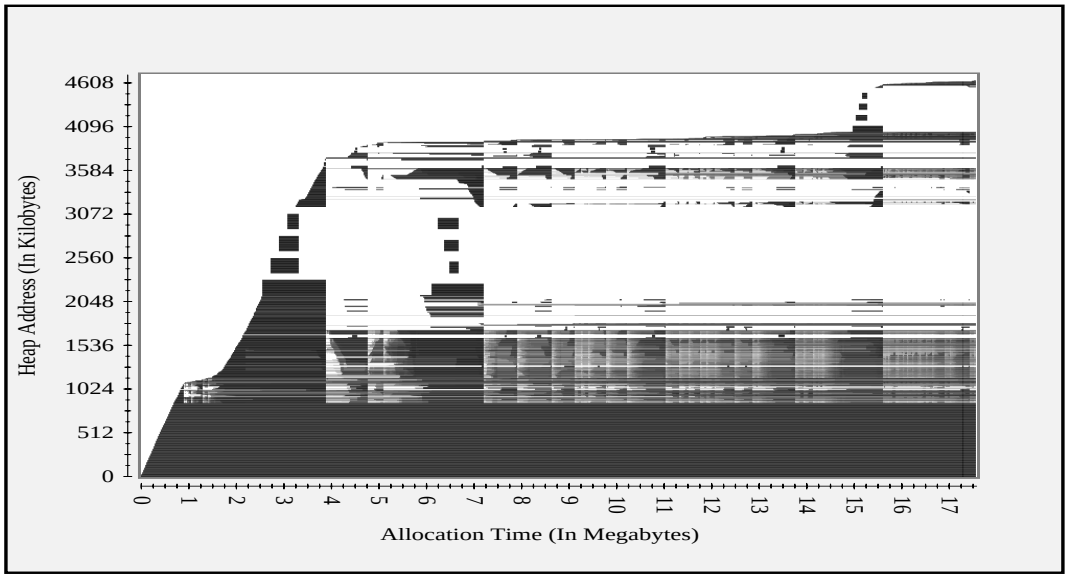

Figure D.15: Fragmentation plot for GCC using the simple segregated storage 2^N allocator (accounting for all overheads)

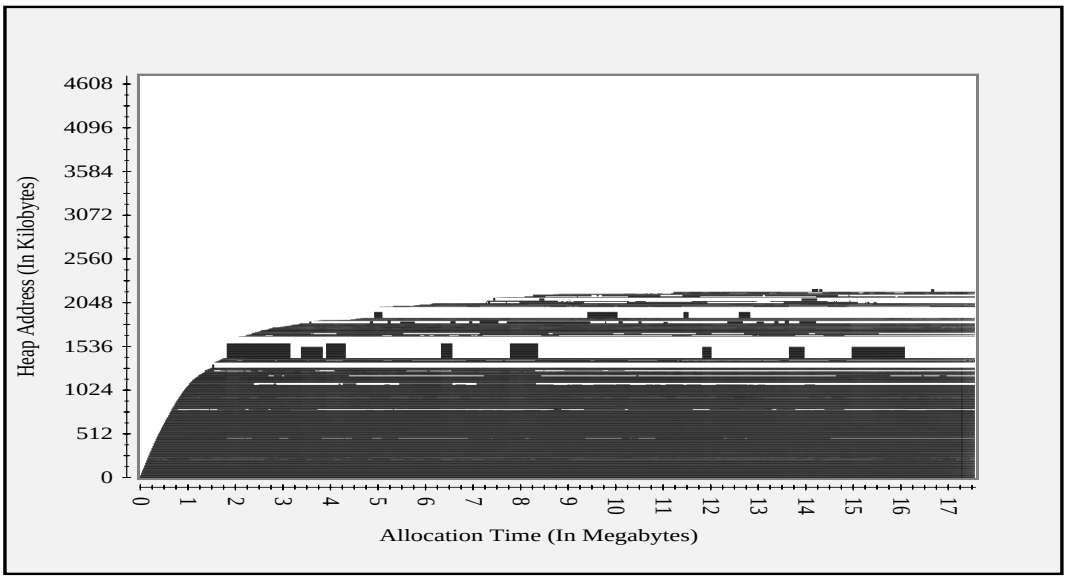

Figure D.16: Fragmentation plot for GCC *shuffled* using the simple segregated storage 2^N allocator (accounting for all overheads)

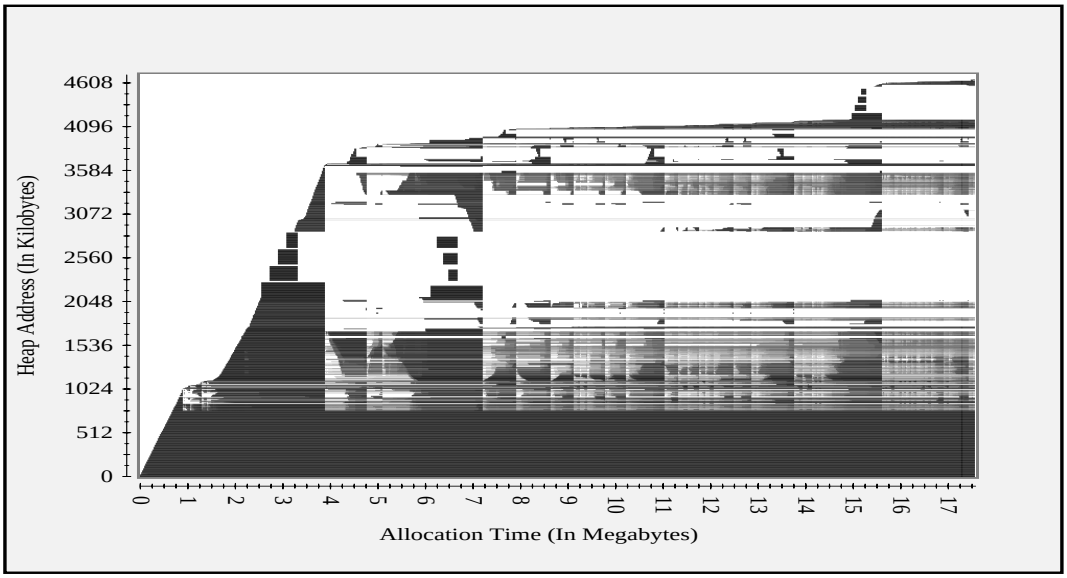

Figure D.17: Fragmentation plot for GCC using the simple segregated storage 2^N & $3 * 2^N$ allocator (accounting for all overheads)

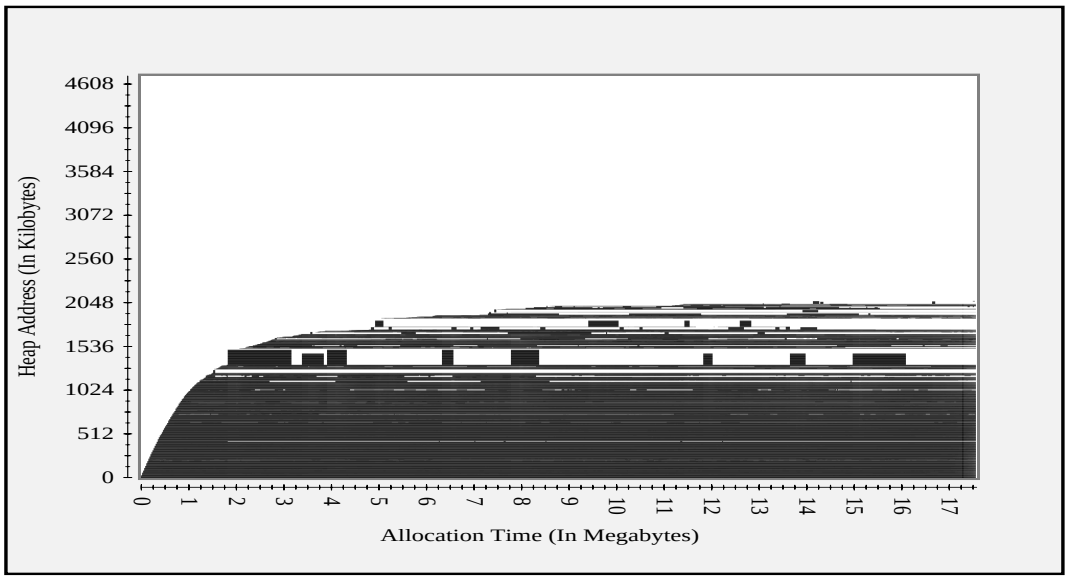

Figure D.18: Fragmentation plot for GCC *shuffled* using the simple segregated storage 2^N & $3 * 2^N$ allocator (accounting for all overheads)

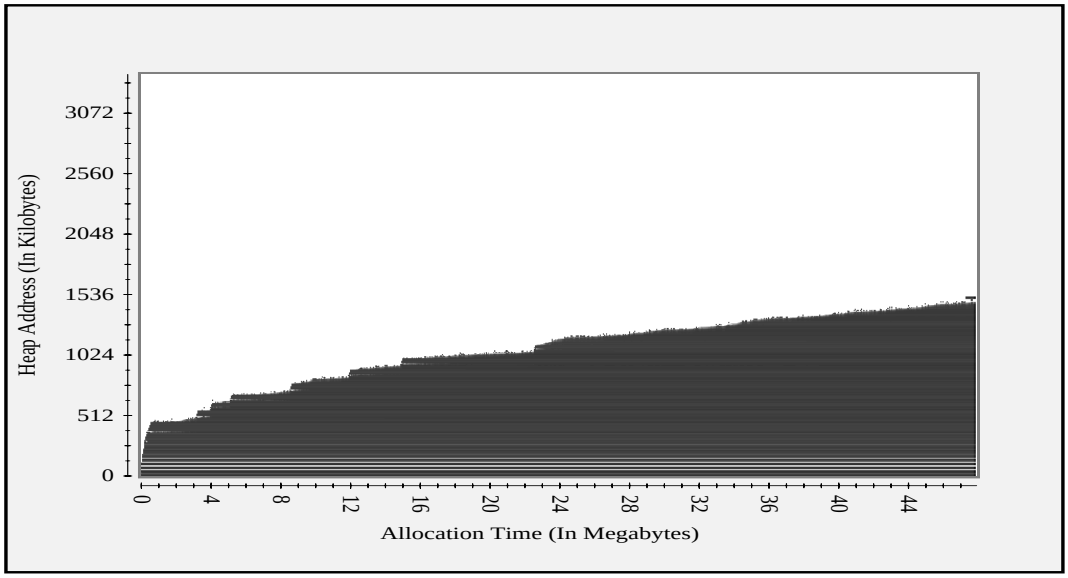

Figure D.19: Fragmentation plot for Ghostscript using the binary-buddy allocator (accounting for all overheads)

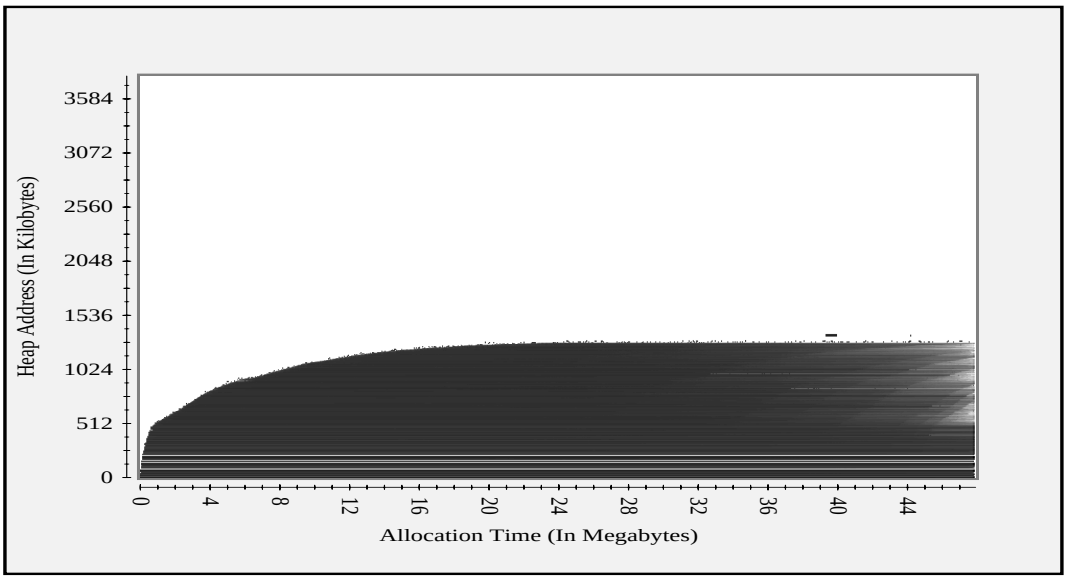

Figure D.20: Fragmentation plot for Ghostscript *shuffled* using the binary-buddy allocator (accounting for all overheads)

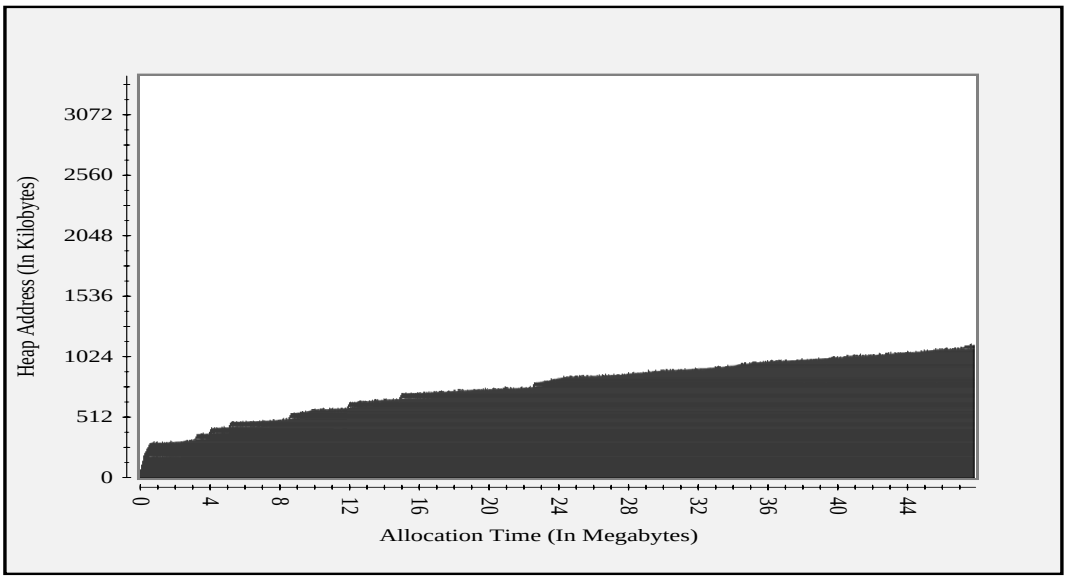

Figure D.21: Fragmentation plot for Ghostscript using the best-fit LIFO no-footer allocator (accounting for all overheads)

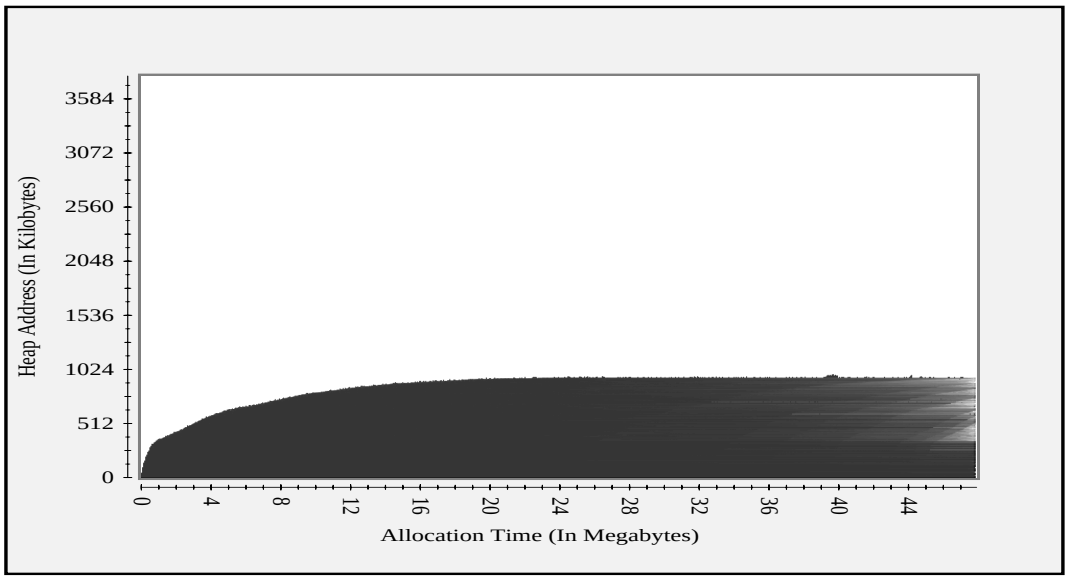

Figure D.22: Fragmentation plot for Ghostscript *shuffled* using the best-fit LIFO no-footer allocator (accounting for all overheads)

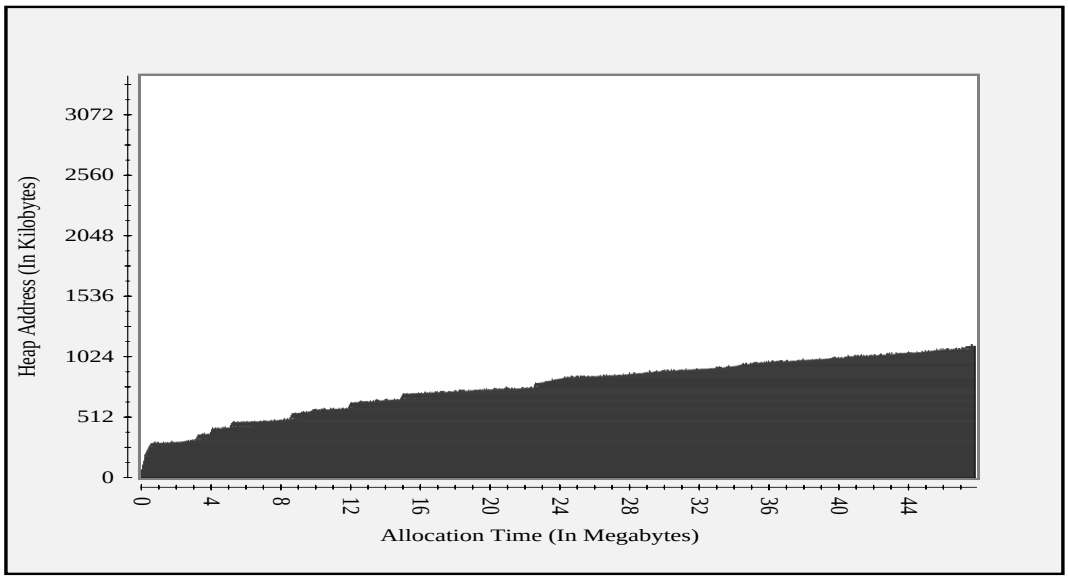

Figure D.23: Fragmentation plot for Ghostscript using the first-fit address-ordered no-footer allocator (accounting for all overheads)

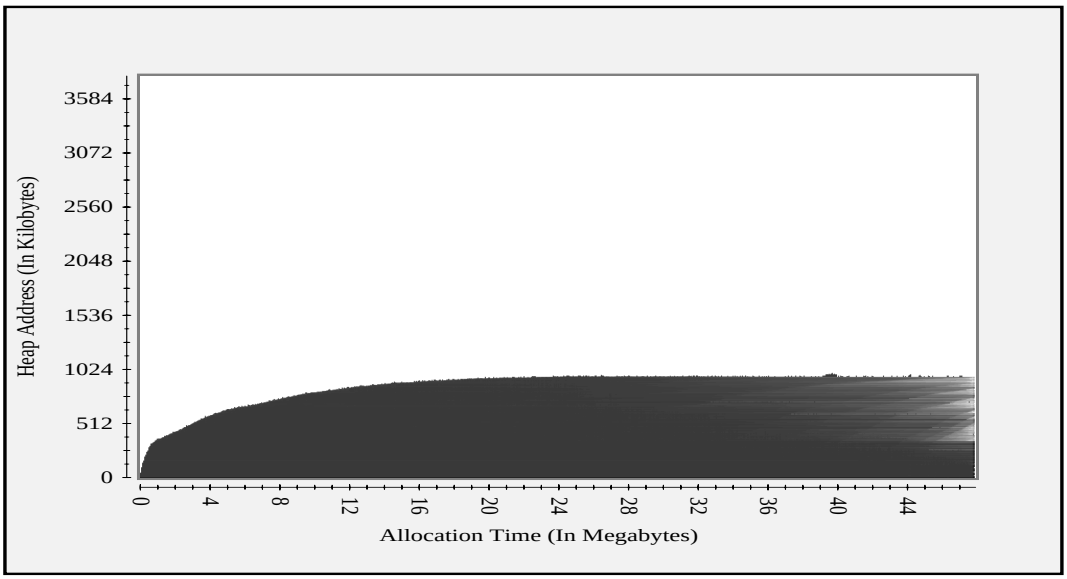

Figure D.24: Fragmentation plot for Ghostscript *shuffled* using the first-fit address-ordered no-footer allocator (accounting for all overheads)

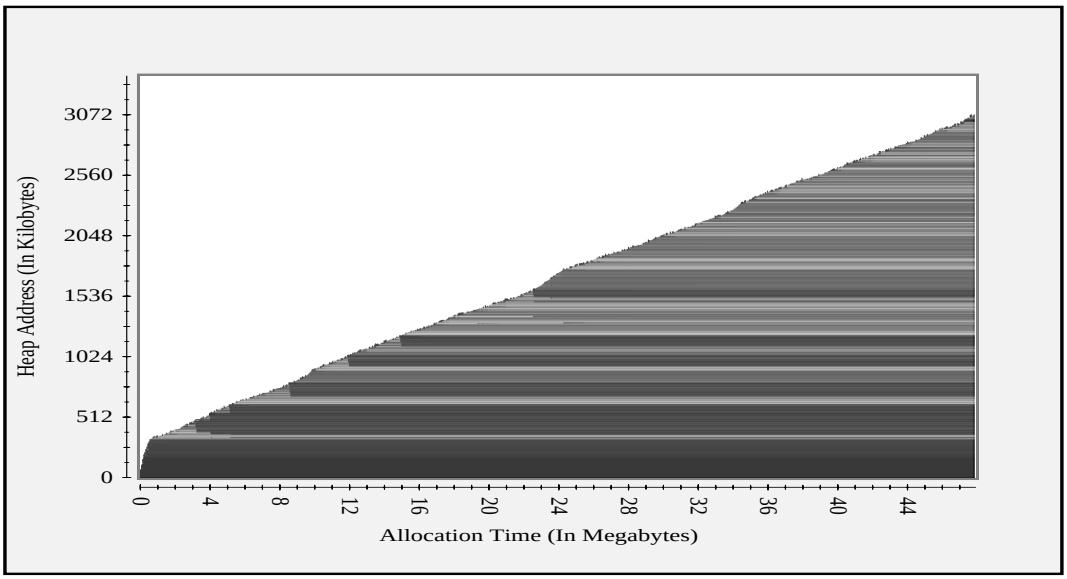

Figure D.25: Fragmentation plot for Ghostscript using the first-fit LIFO no-footer allocator (accounting for all overheads)

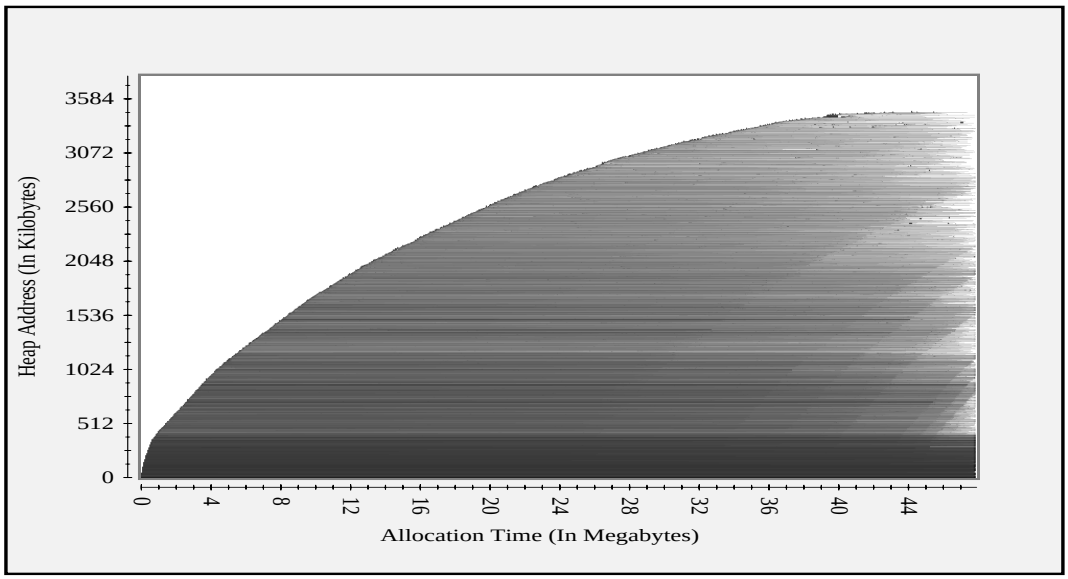

Figure D.26: Fragmentation plot for Ghostscript *shuffled* using the first-fit LIFO no-footer allocator (accounting for all overheads)

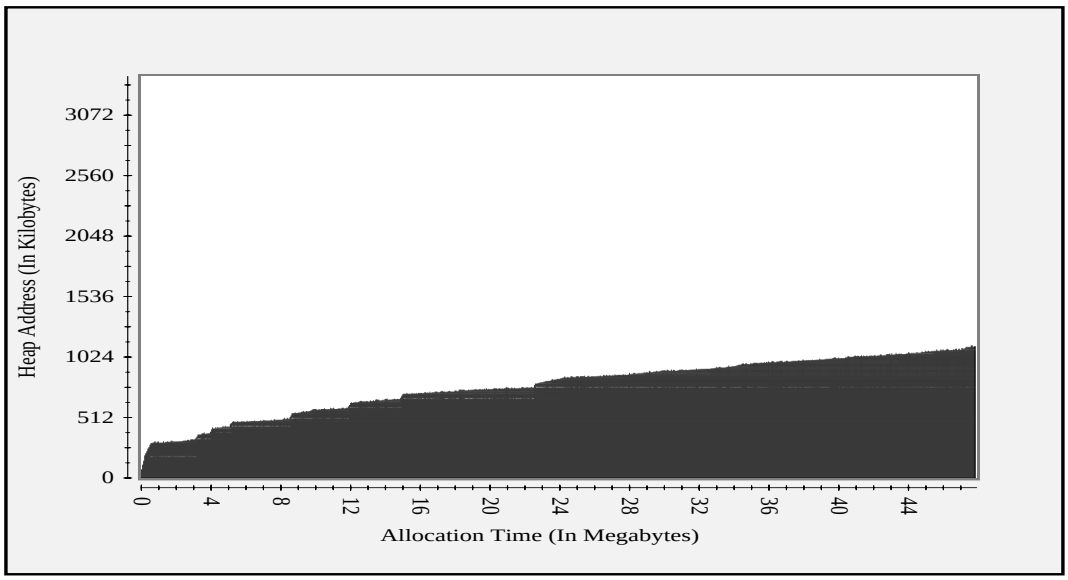

Figure D.27: Fragmentation plot for Ghostscript using the half-fit allocator (accounting for all overheads)

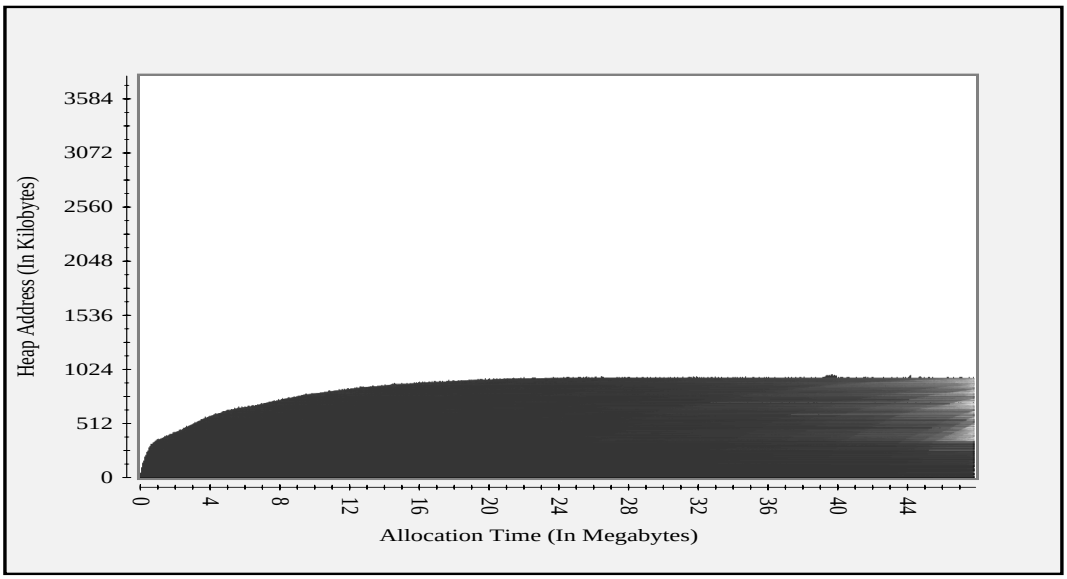

Figure D.28: Fragmentation plot for Ghostscript *shuffled* using the half-fit allocator (accounting for all overheads)

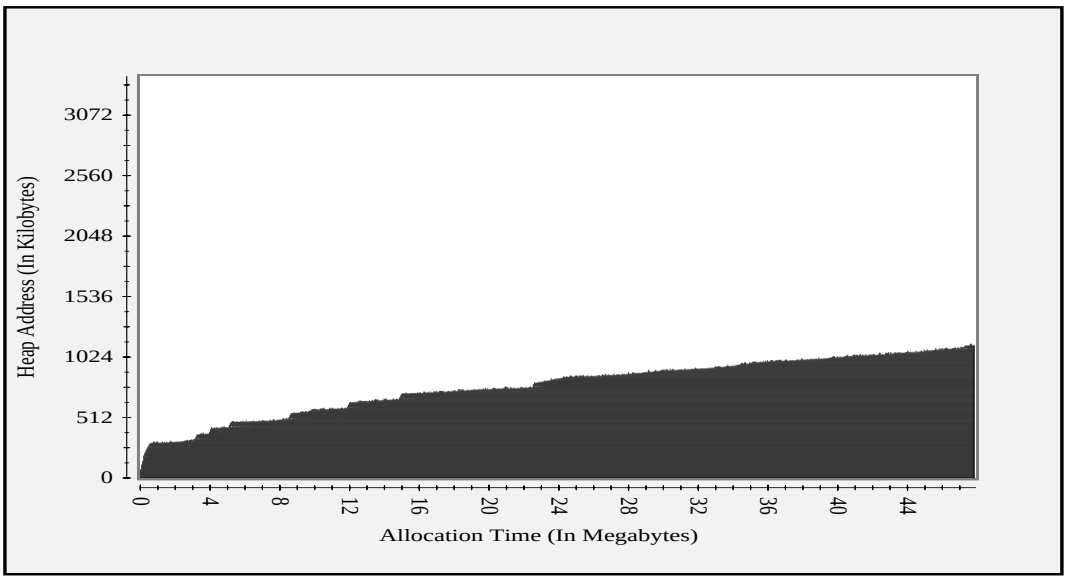

Figure D.29: Fragmentation plot for Ghostscript using Lea's 2.6.1 allocator (accounting for all overheads)

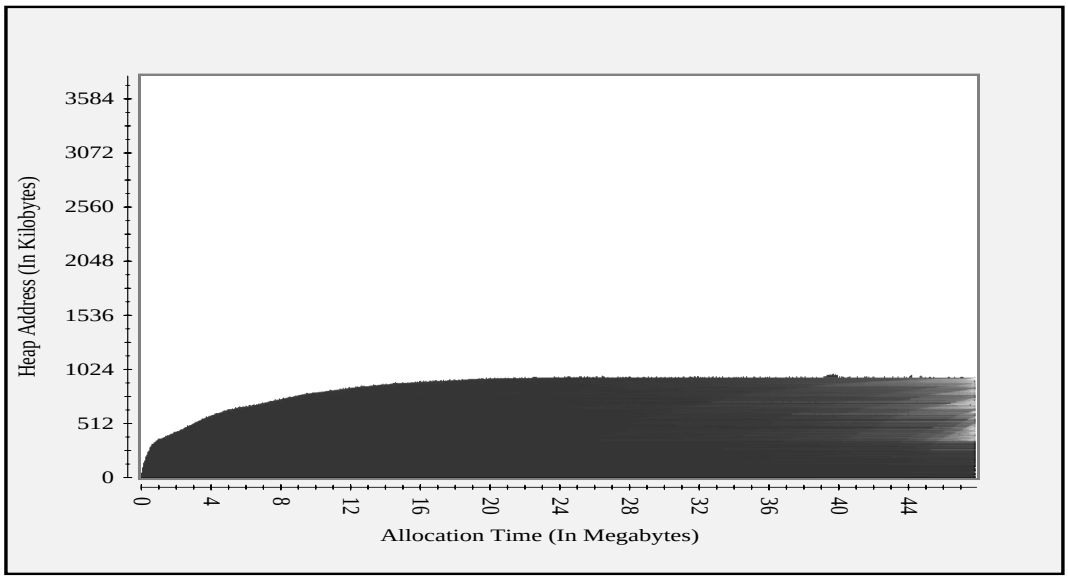

Figure D.30: Fragmentation plot for Ghostscript *shuffled* using Lea's 2.6.1 allocator (accounting for all overheads)

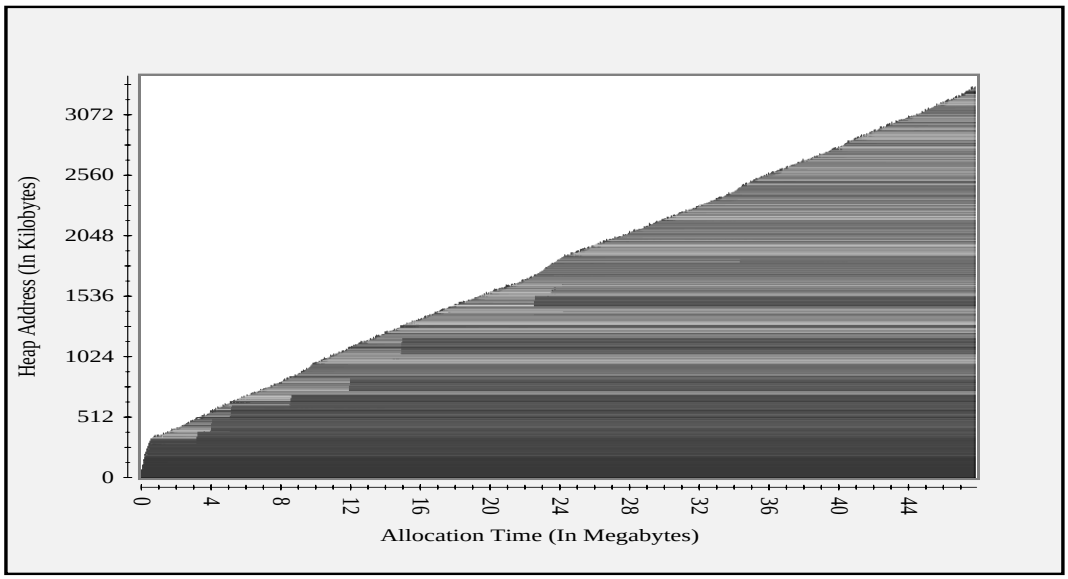

Figure D.31: Fragmentation plot for Ghostscript using the next-fit LIFO no-footer allocator (accounting for all overheads)

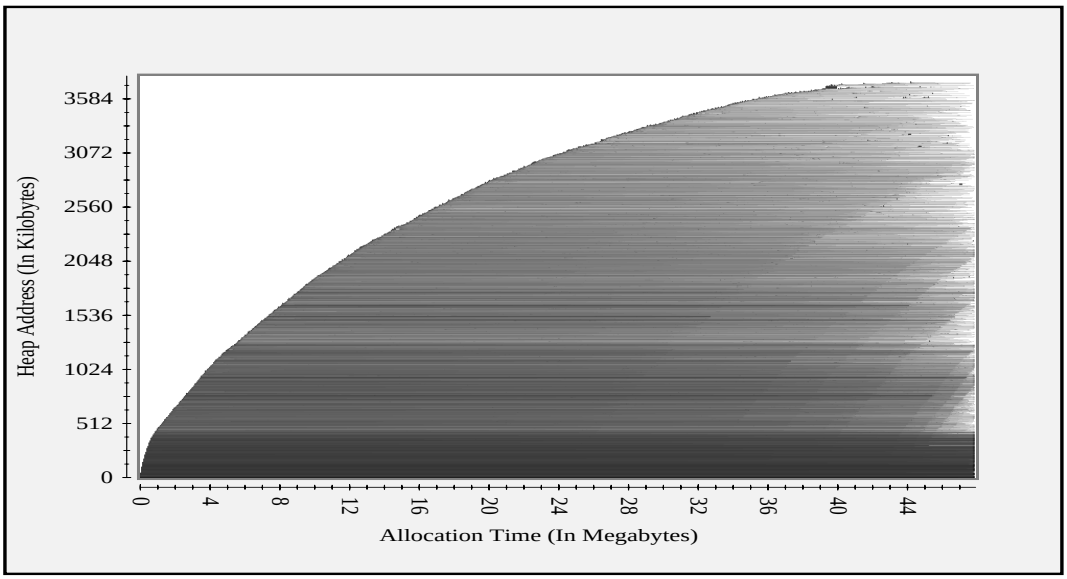

Figure D.32: Fragmentation plot for Ghostscript *shuffled* using the nest-fit LIFO no-footer allocator (accounting for all overheads)

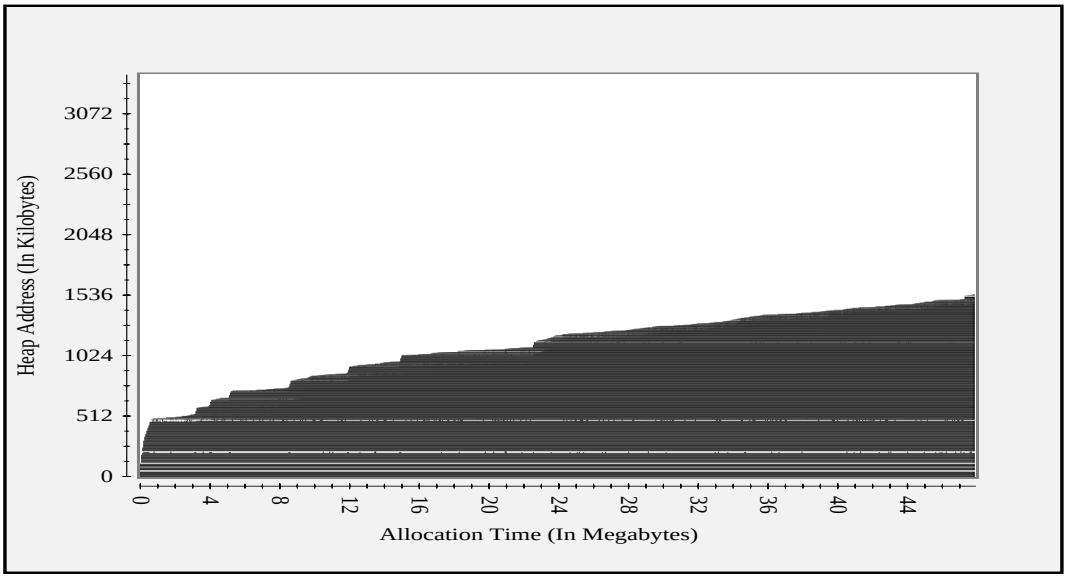

Figure D.33: Fragmentation plot for Ghostscript using the simple segregated storage 2^N allocator (accounting for all overheads)

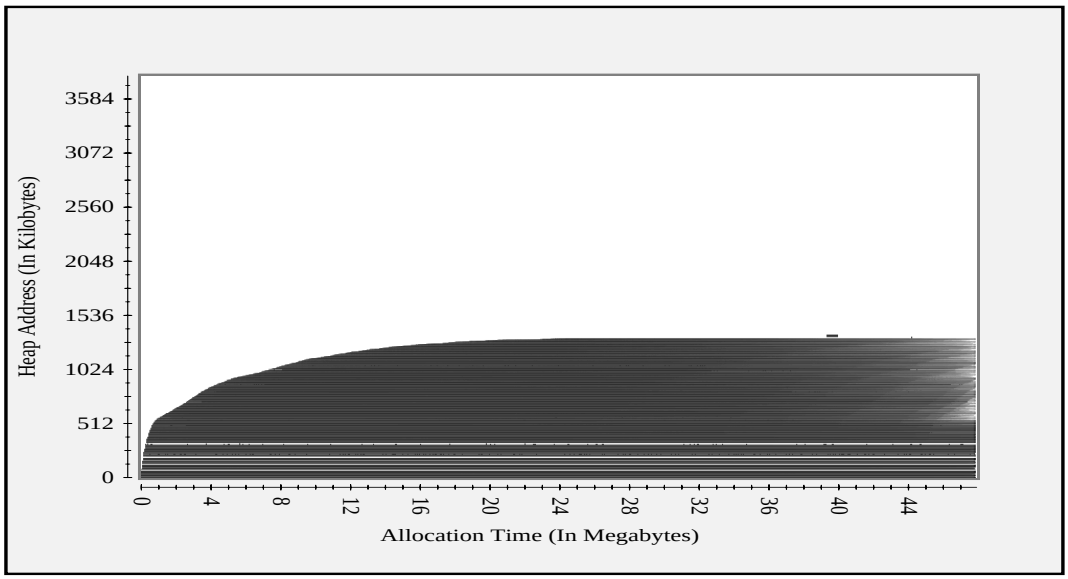

Figure D.34: Fragmentation plot for Ghostscript *shuffled* using the using the simple segregated storage 2^N allocator (accounting for all overheads)

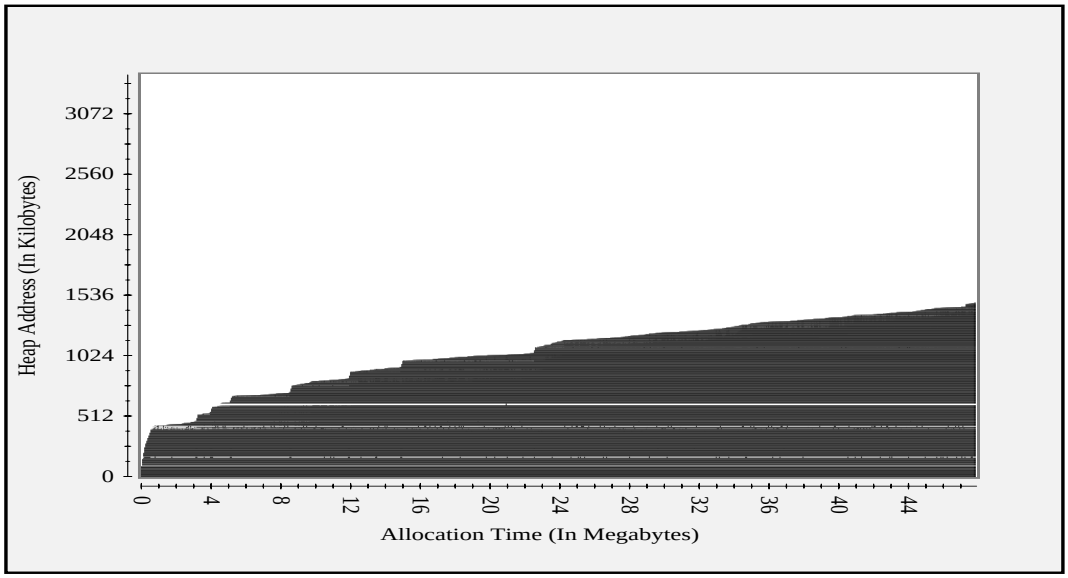

Figure D.35: Fragmentation plot for Ghostscript using the simple segregated storage 2^N & $3 * 2^N$ allocator (accounting for all overheads)

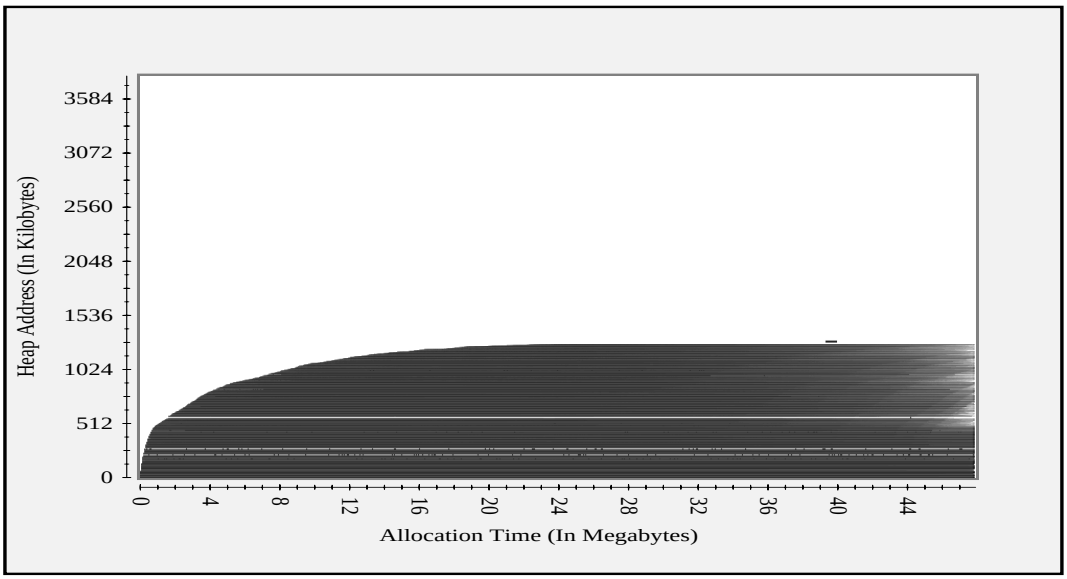

Figure D.36: Fragmentation plot for Ghostscript *shuffled* using the simple segregated storage 2^N $3 * 2^N$ allocator (accounting for all overheads)

Appendix E

Locality Plots for Selected Allocators

The graphs that follow are memory access plots of the form first shown in Section 3.9. These pictures show loads and stores to heap locations over time for each of the selected allocators. As was described in Section 3.9, darker pixels indicate a larger number of loads and stores to a particular region of memory at a particular point in time.

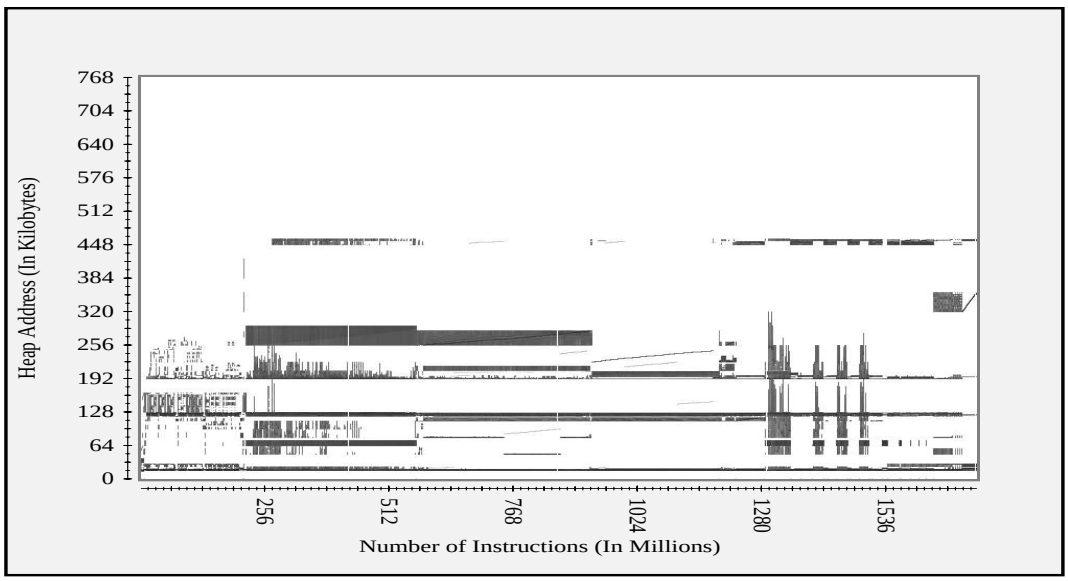

Figure E.1: Memory access plot for Espresso using the binary-buddy allocator

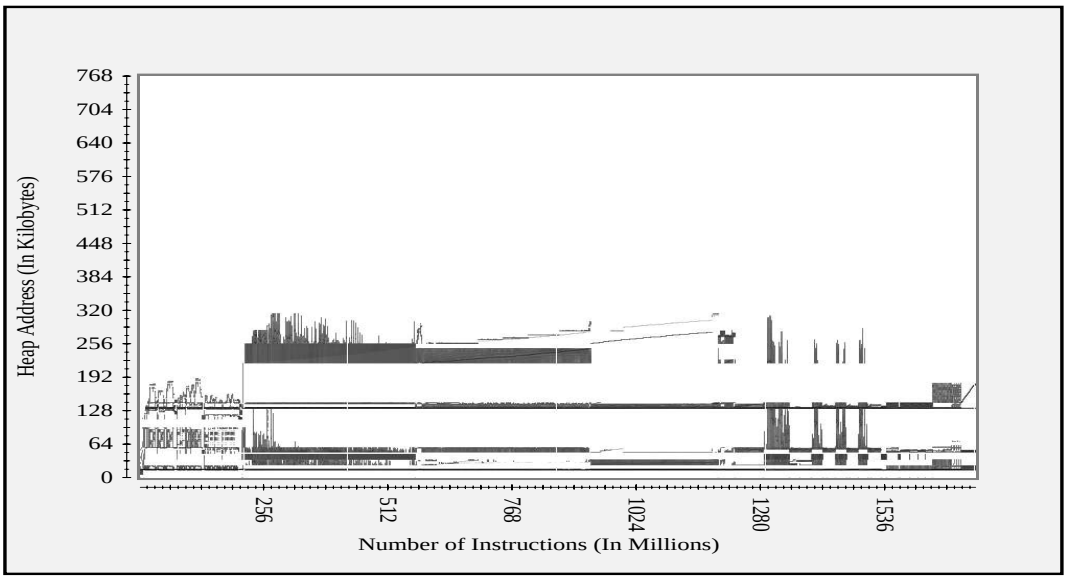

Figure E.2: Memory access plot for Espresso using the best-fit LIFO no-footer allocator

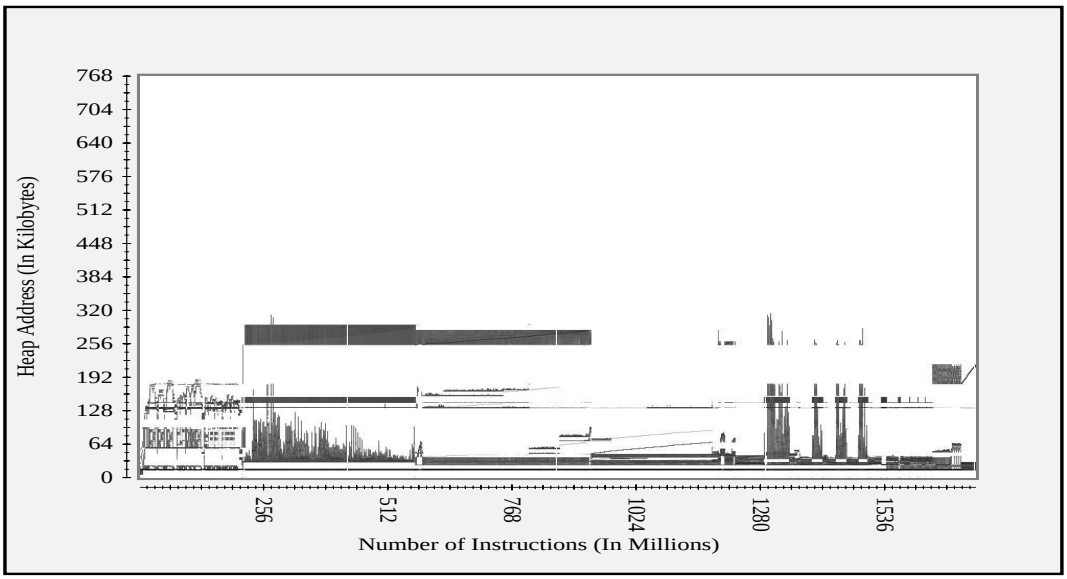

Figure E.3: Memory access plot for Espresso using the first-fit address-ordered no-footer allocator

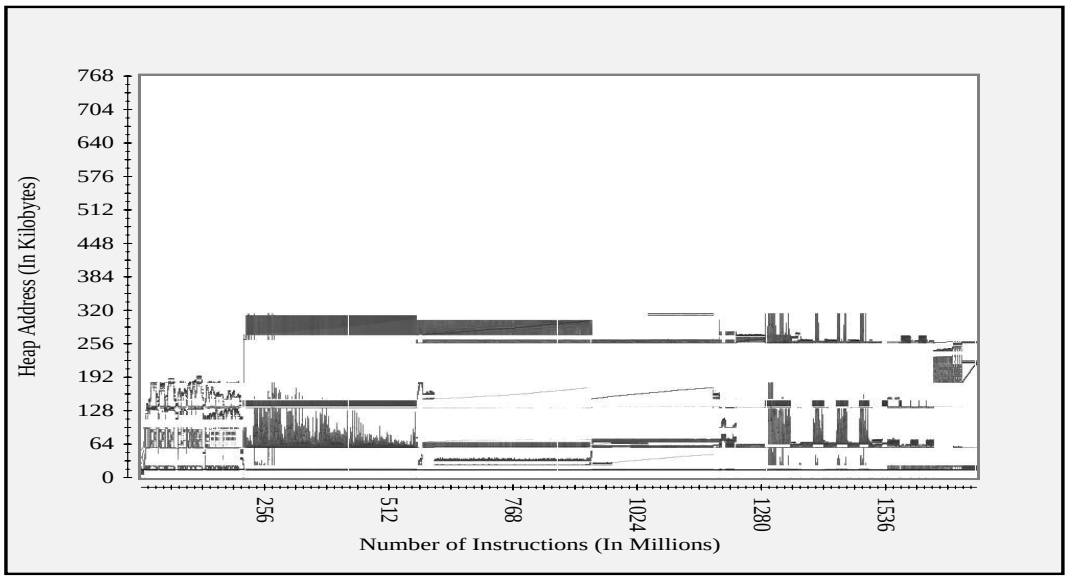

Figure E.4: Memory access plot for Espresso using the first-fit LIFO no-footer allocator

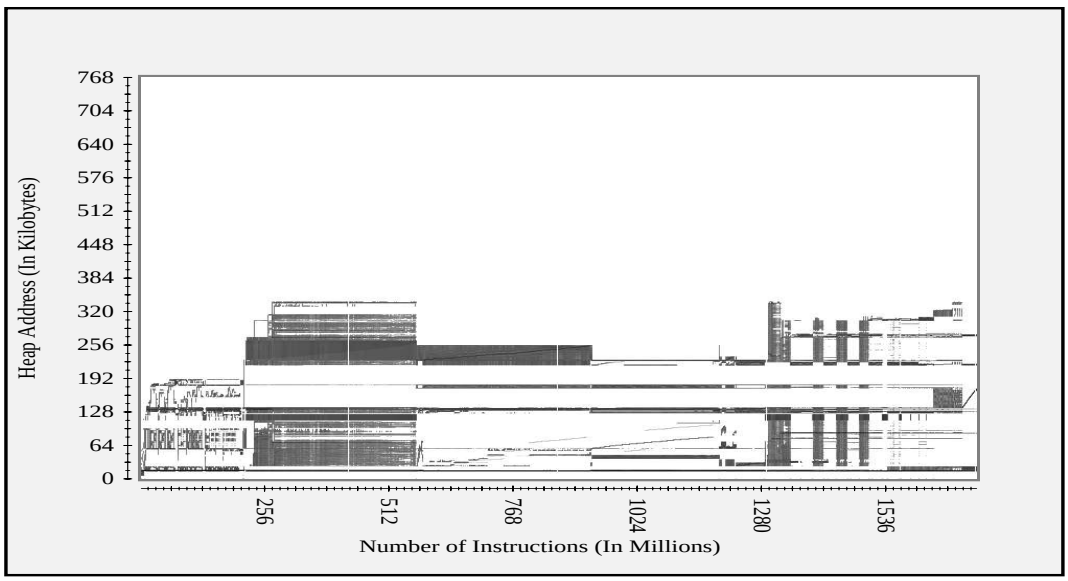

Figure E.5: Memory access plot for Espresso using the half-fit allocator

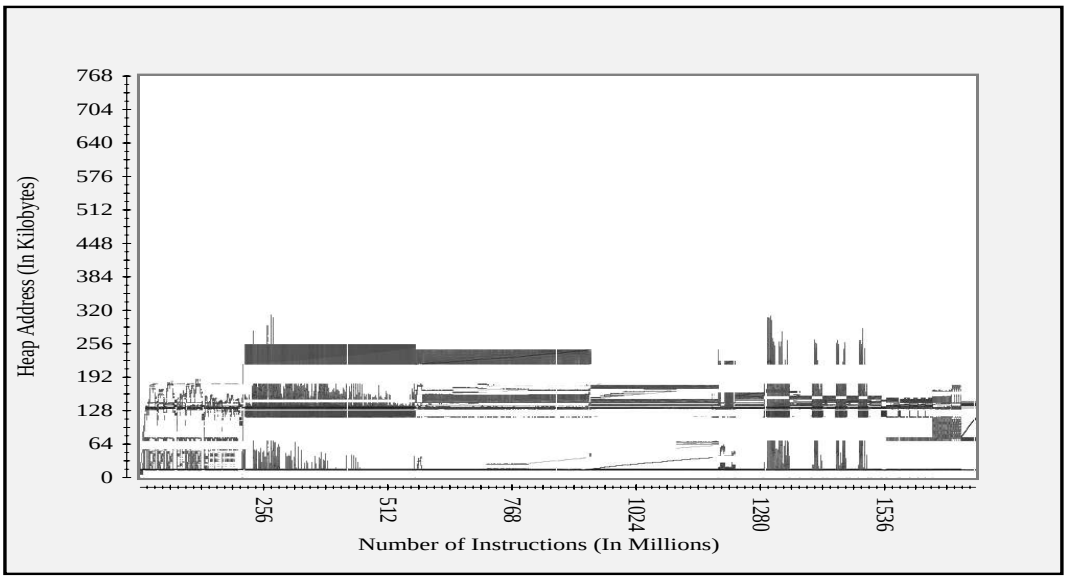

Figure E.6: Memory access plot for Espresso using Lea's 2.6.1 allocator

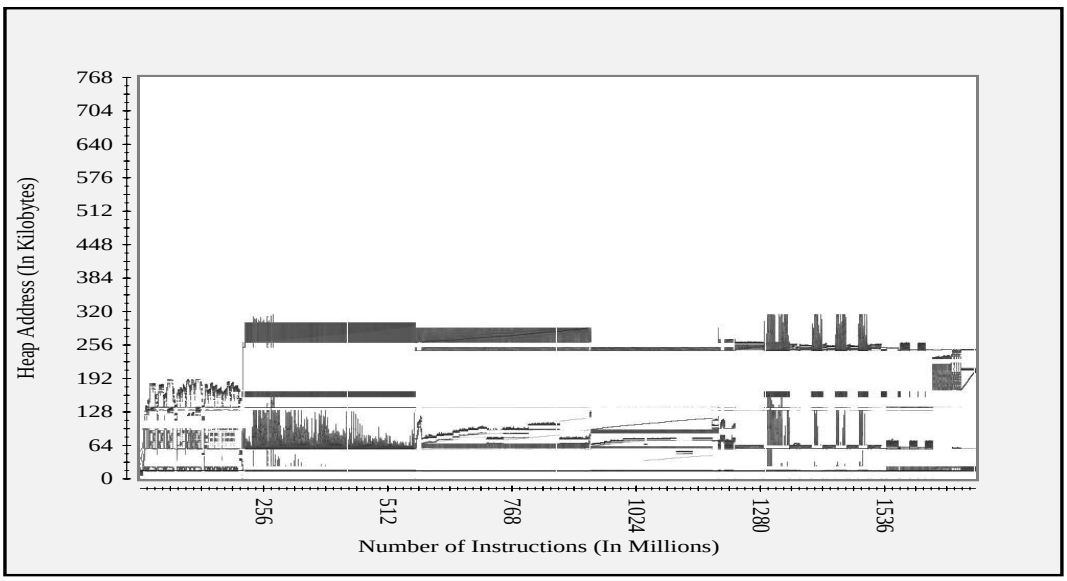

Figure E.7: Memory access plot for Espresso using the next-fit LIFO no-footer allocator

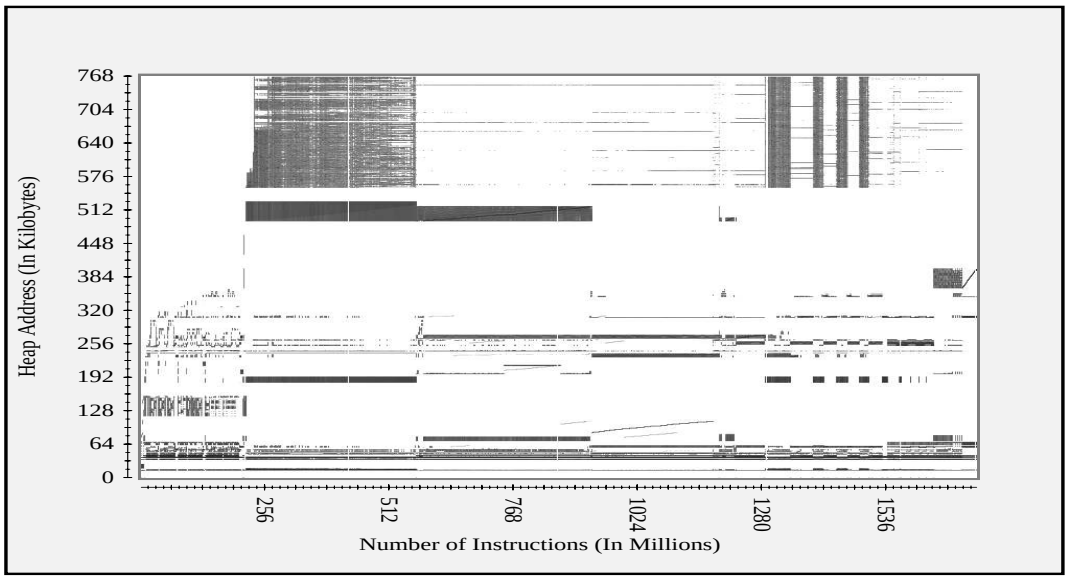

Figure E.8: Memory access plot for Espresso using the simple segregated storage 2^N allocator

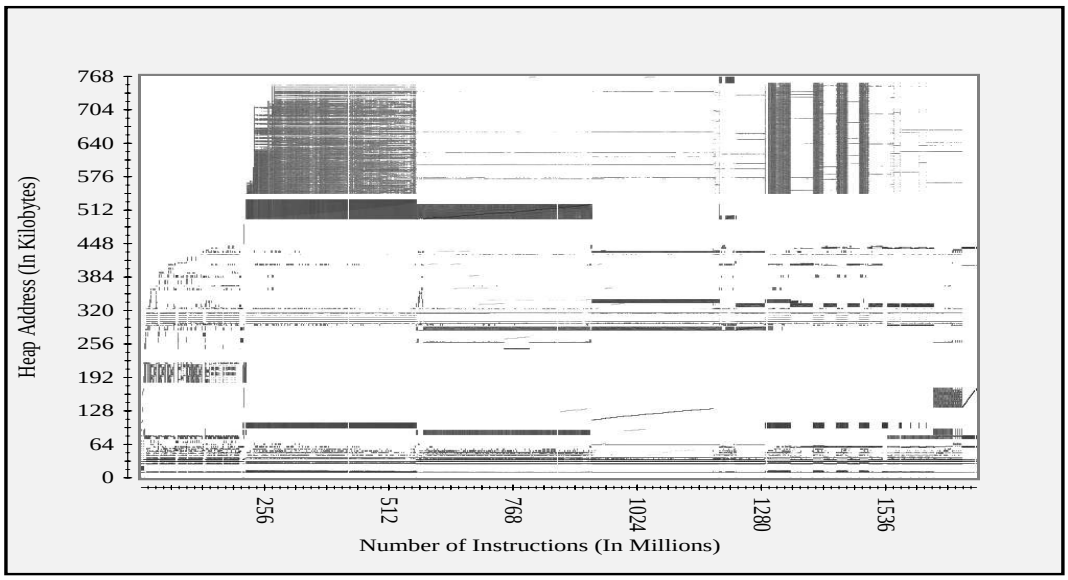

Figure E.9: Memory access plot for Espresso using the simple segregated storage 2^N & $3 * 2^N$ allocator

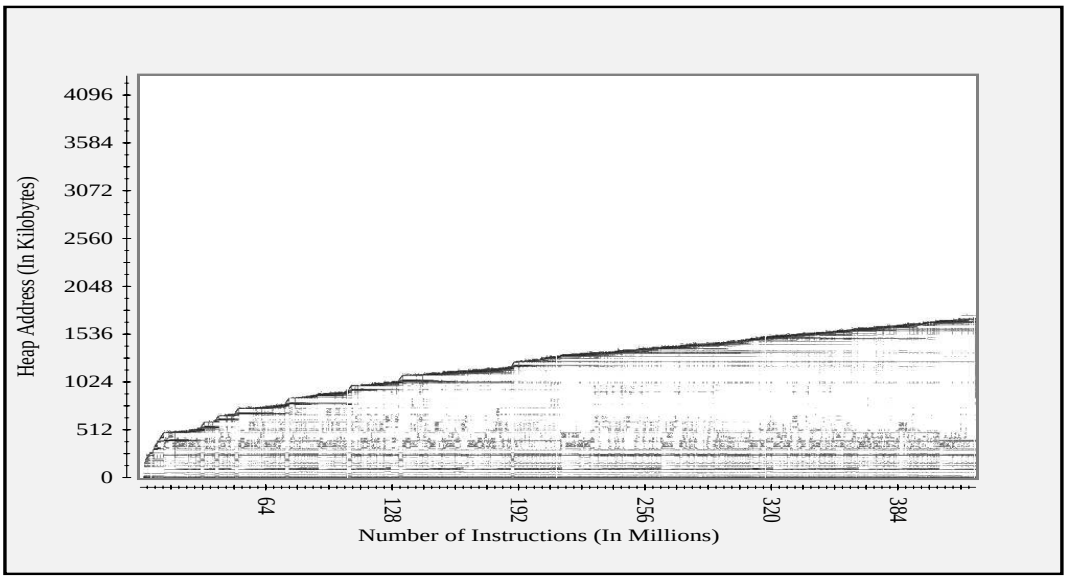

Figure E.10: Memory access plot for Ghostscript using the binary-buddy allocator

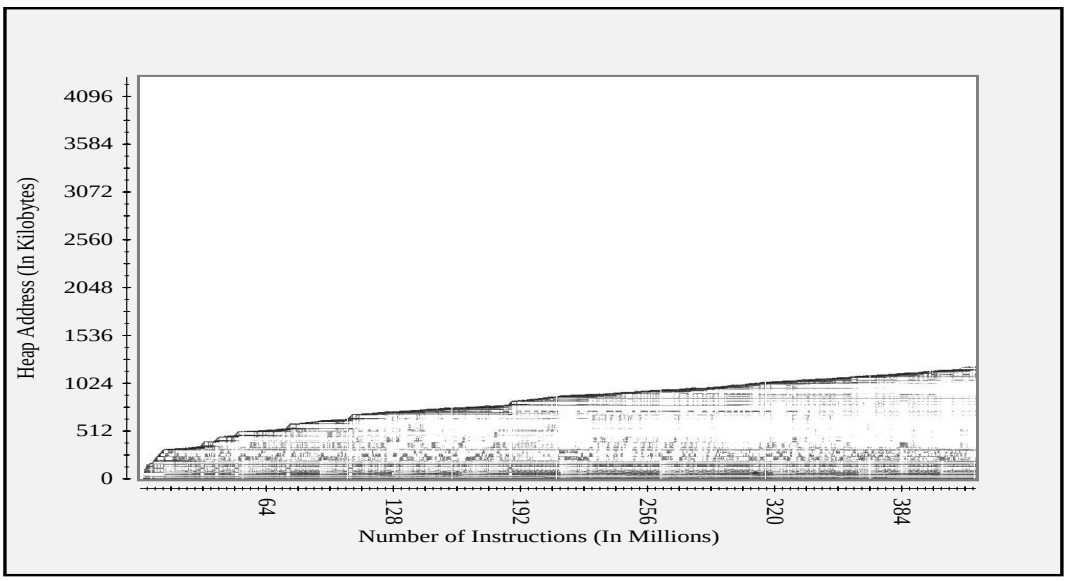

Figure E.11: Memory access plot for Ghostscript using the best-fit LIFO no-footer allocator

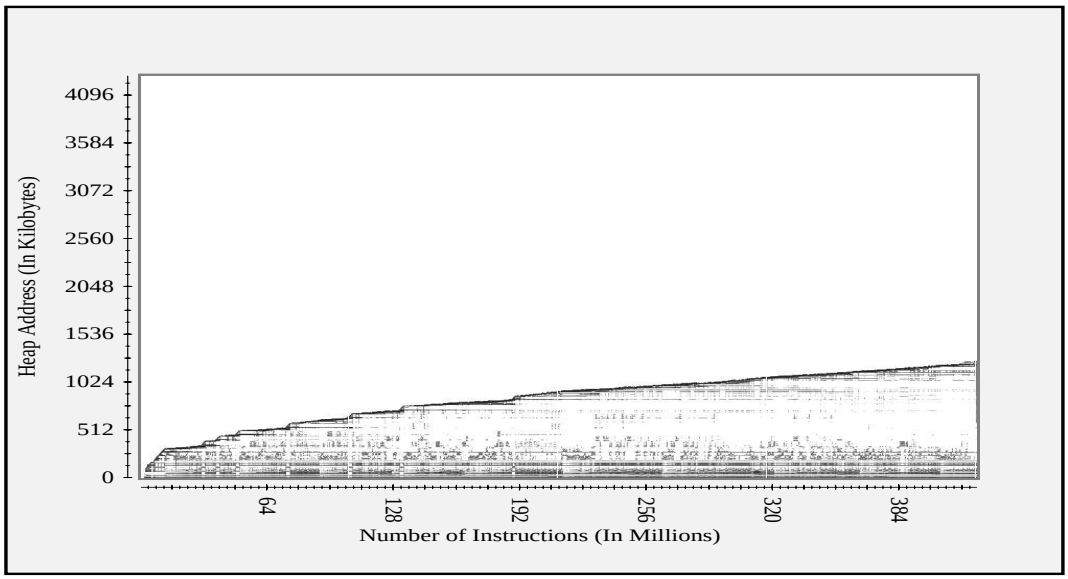

Figure E.12: Memory access plot for Ghostscript using the first-fit address-ordered no-footer allocator

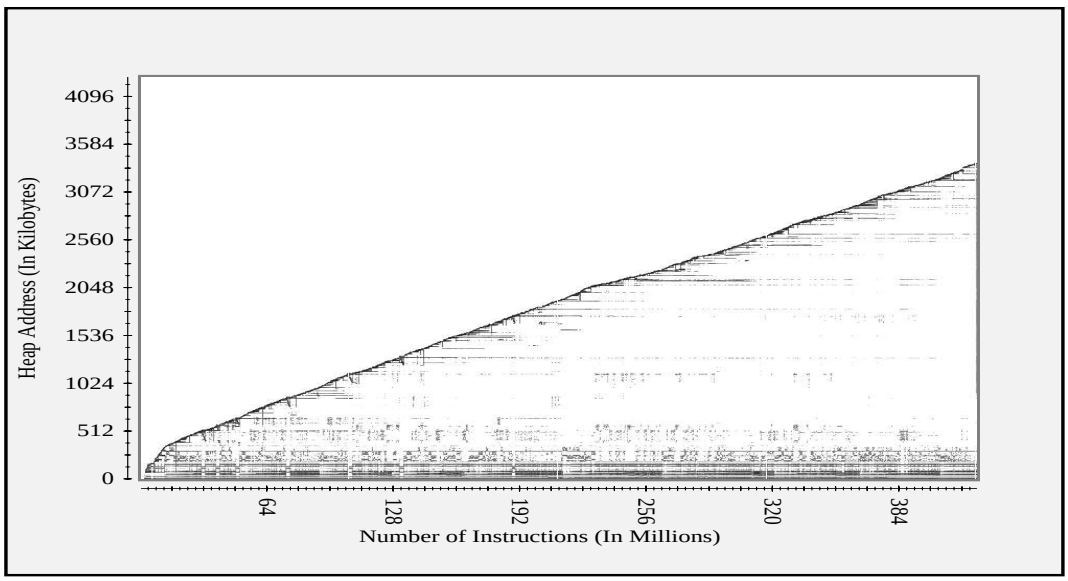

Figure E.13: Memory access plot for Ghostscript using the first-fit LIFO no-footer allocator

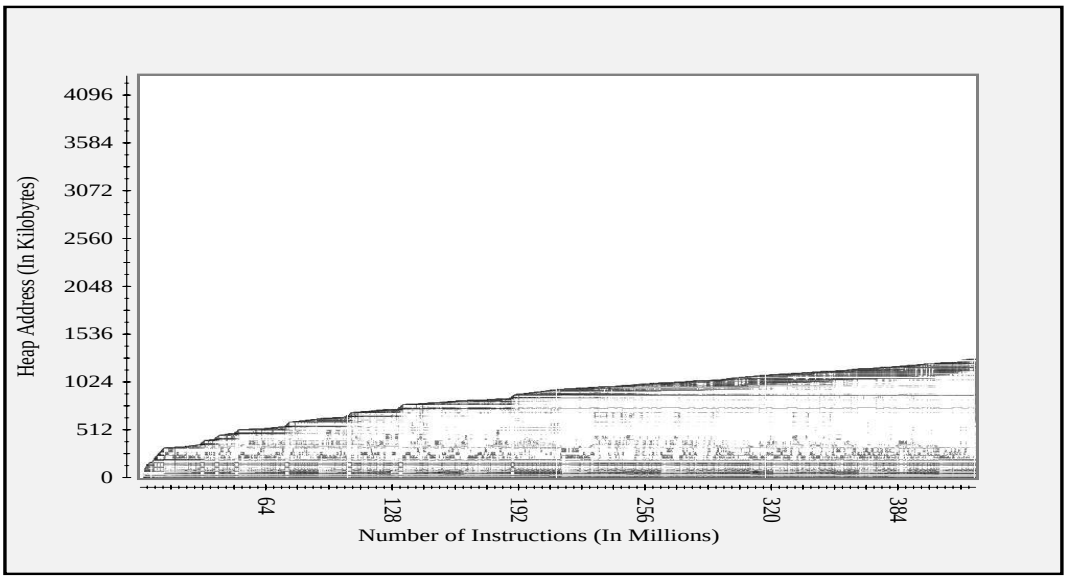

Figure E.14: Memory access plot for Ghostscript using the half-fit allocator

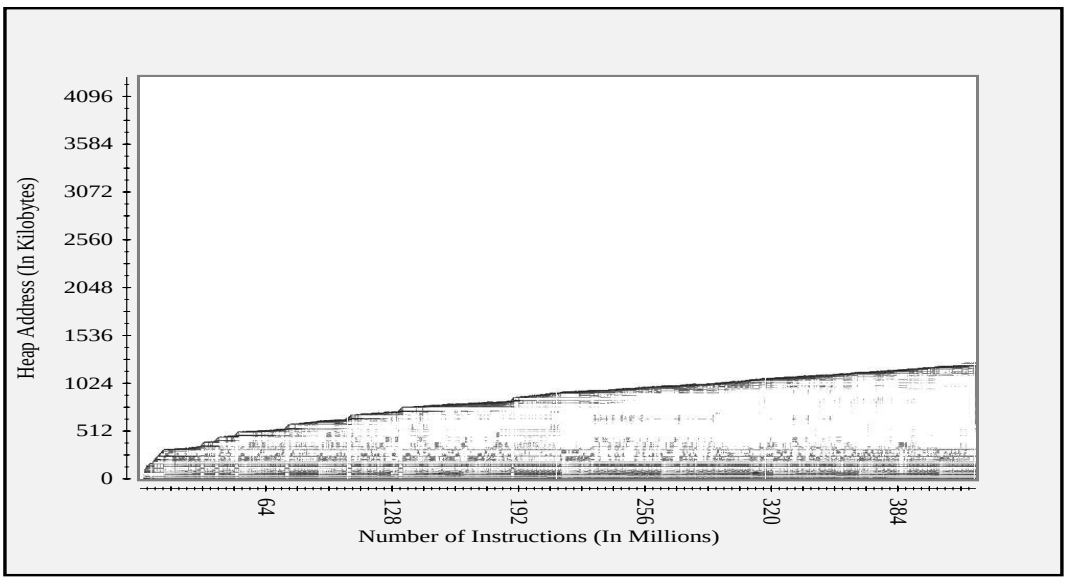

Figure E.15: Memory access plot for Ghostscript using Lea's 2.6.1 allocator

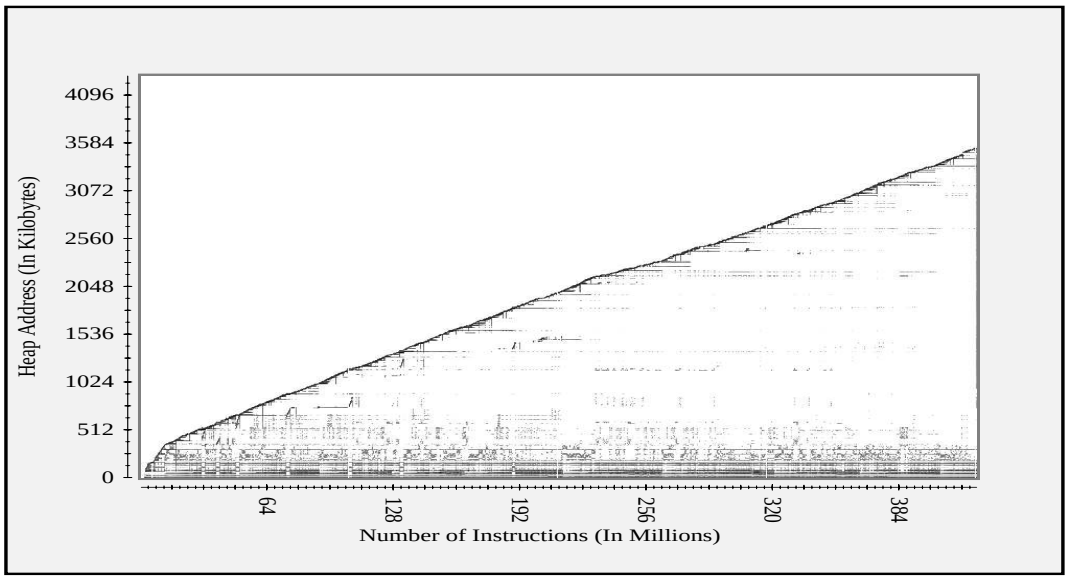

Figure E.16: Memory access plot for Ghostscript using the next-fit LIFO no-footer allocator

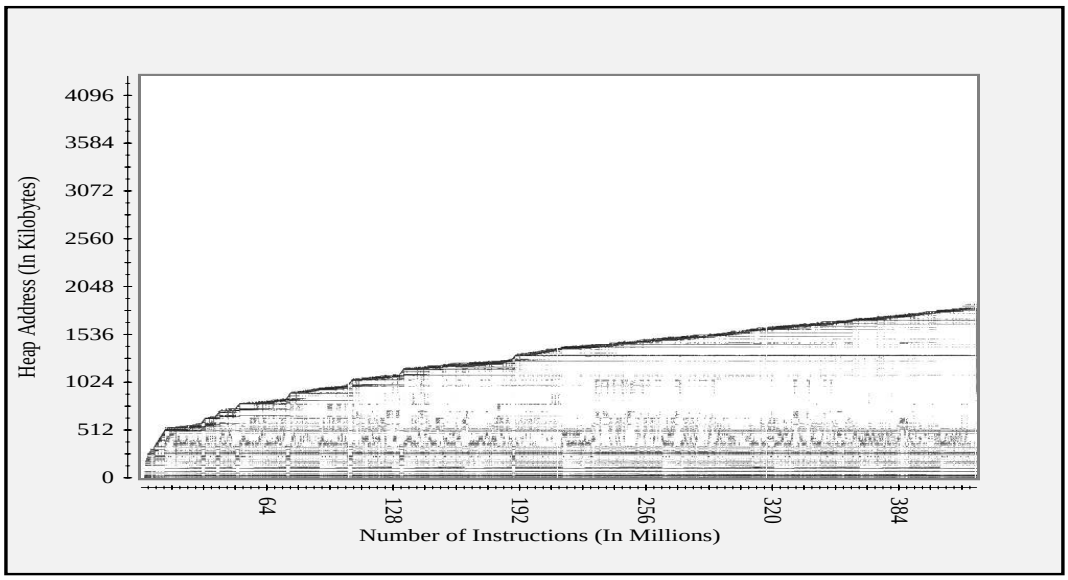

Figure E.17: Memory access plot for Ghostscript using the simple segregated storage 2^N allocator

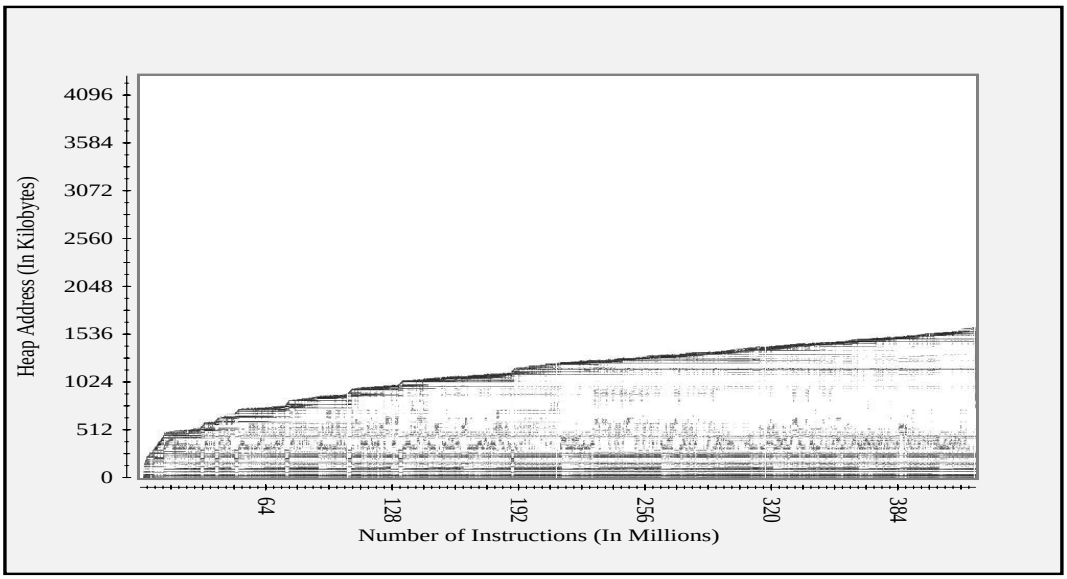

Figure E.18: Memory access plot for Ghostscript using the simple segregated storage 2^N & $3 * 2^N$ allocator

Figure E.19: Memory access plot for Grobner using the binary-buddy allocator

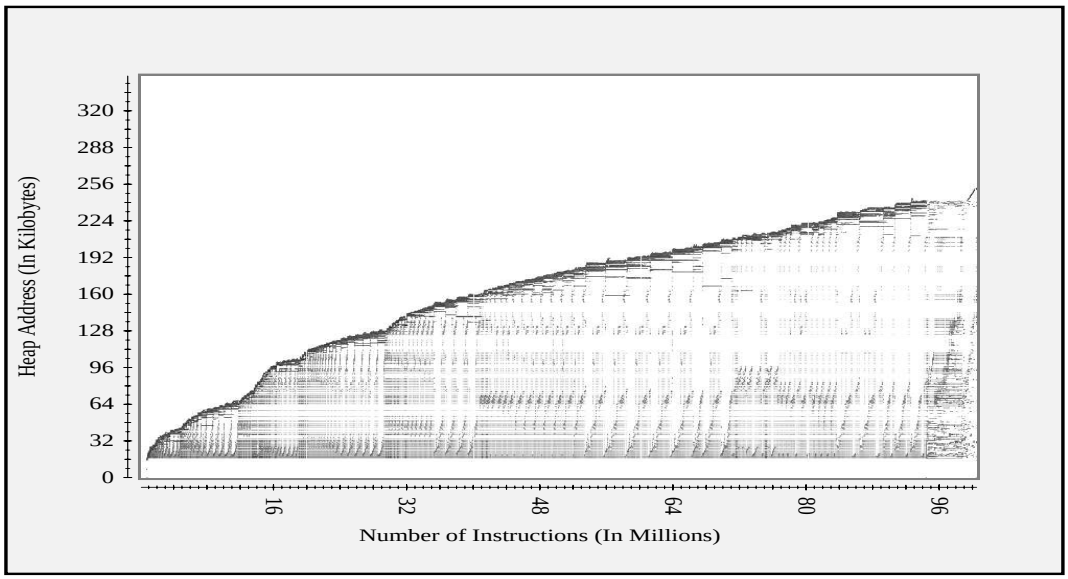

Figure E.20: Memory access plot for Grobner using the best-fit LIFO no-footer allocator

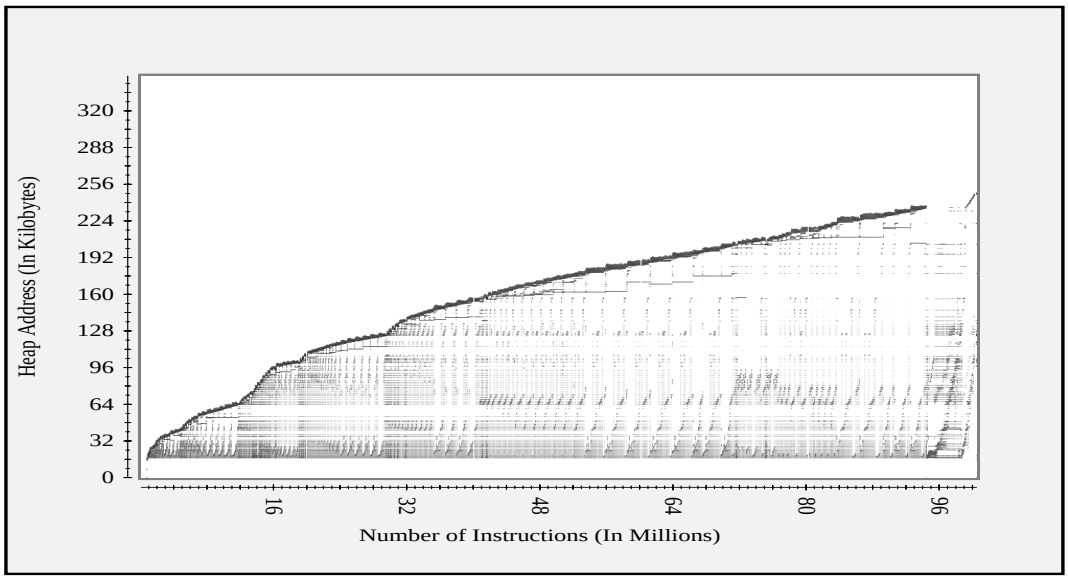

Figure E.21: Memory access plot for Grobner using the first-fit address-ordered no-footer allocator

Figure E.22: Memory access plot for Grobner using the first-fit LIFO no-footer allocator

Figure E.23: Memory access plot for Grobner using the half-fit allocator

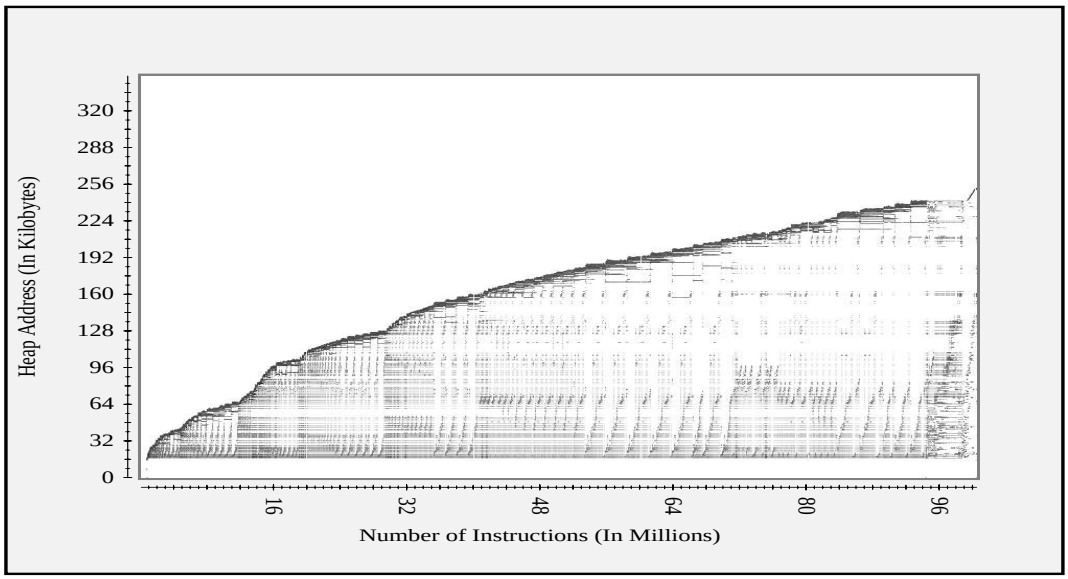

Figure E.24: Memory access plot for Grobner using Lea's 2.6.1 allocator

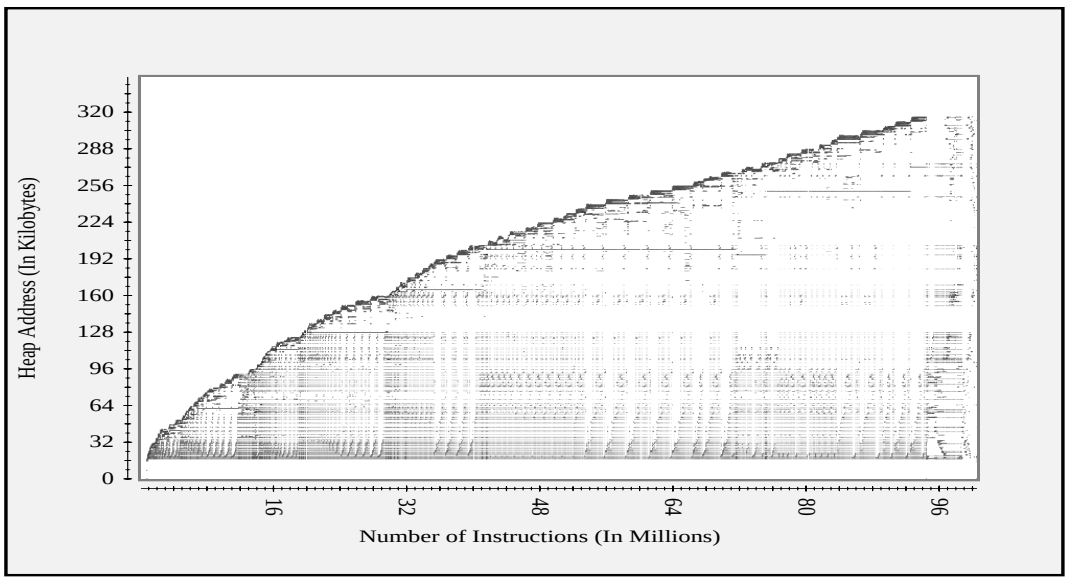

Figure E.25: Memory access plot for Grobner using the next-fit LIFO no-footer allocator

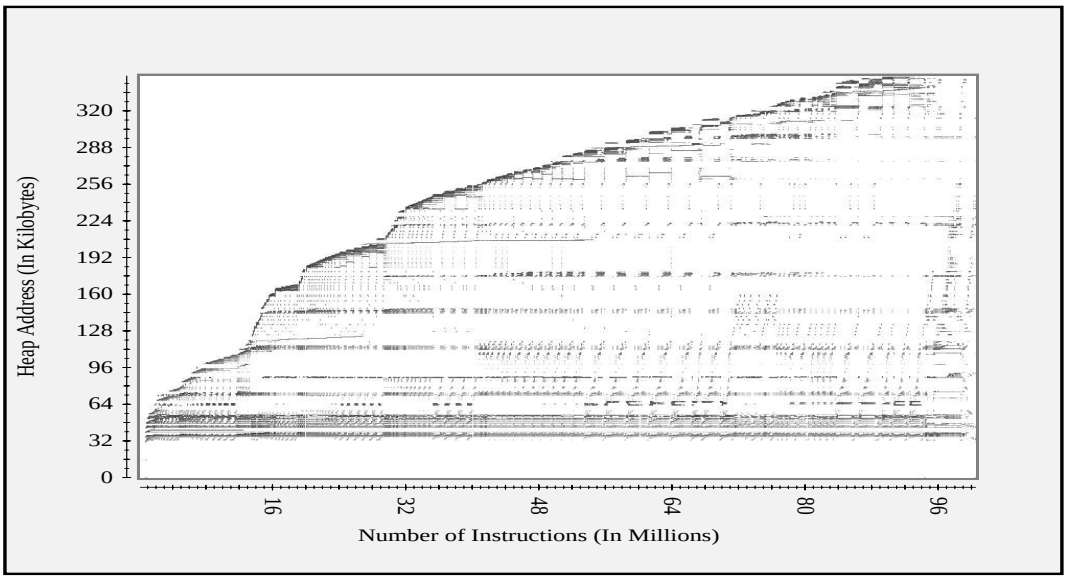

Figure E.26: Memory access plot for Grobner using the simple segregated storage 2^N allocator

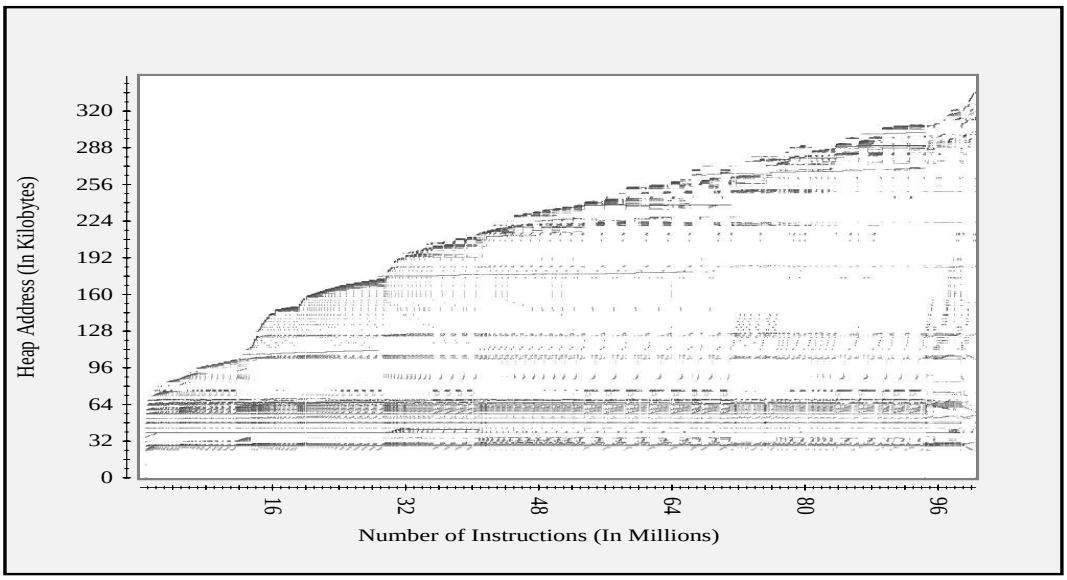

Figure E.27: Memory access plot for Grobner using the simple segregated storage 2^N & $3*2^N$ allocator

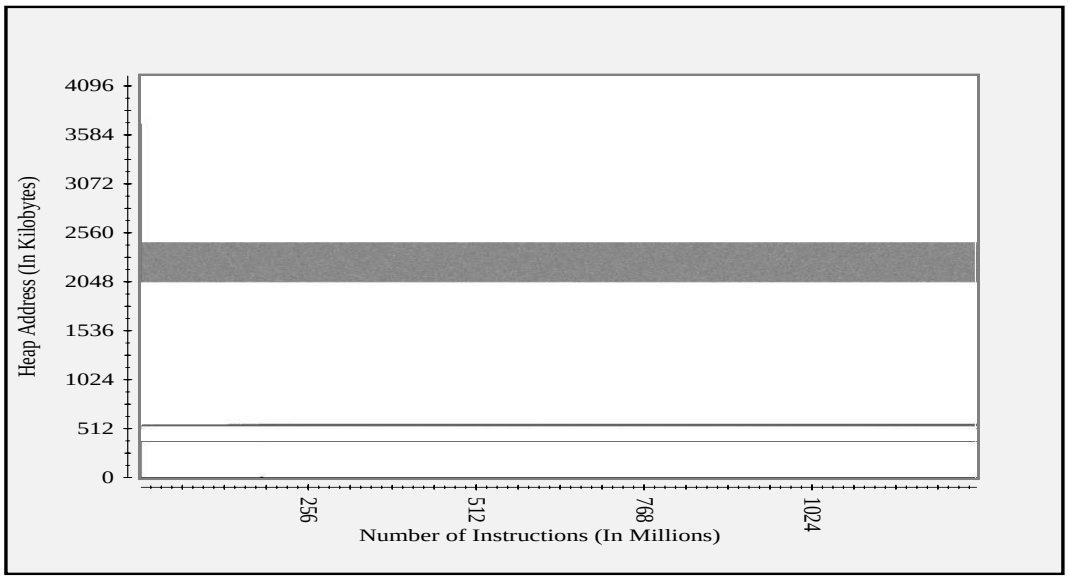

Figure E.28: Memory access plot for Hyper using the binary-buddy allocator

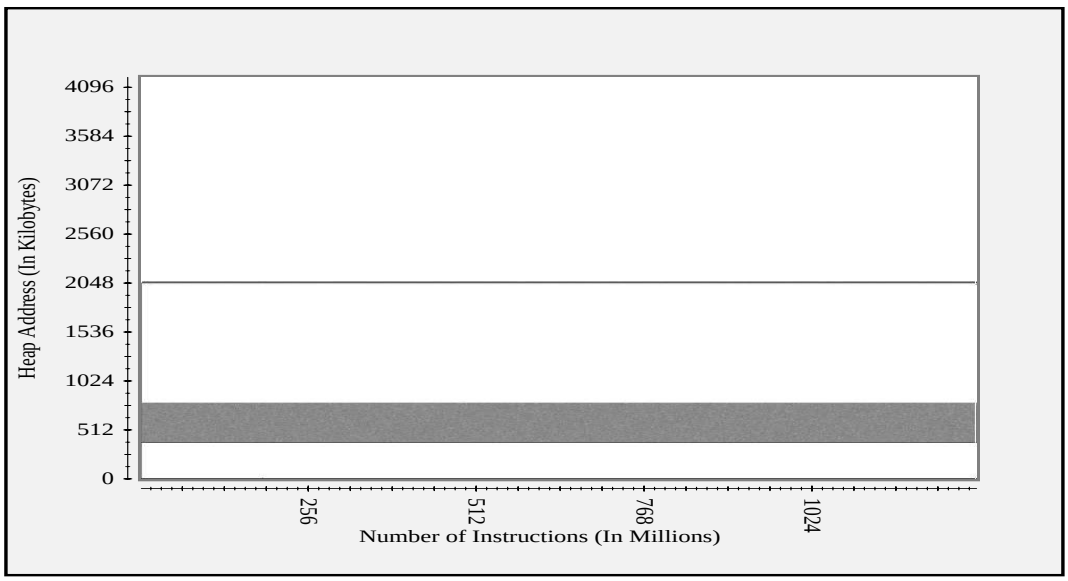

Figure E.29: Memory access plot for Hyper using the best-fit LIFO no-footer allocator

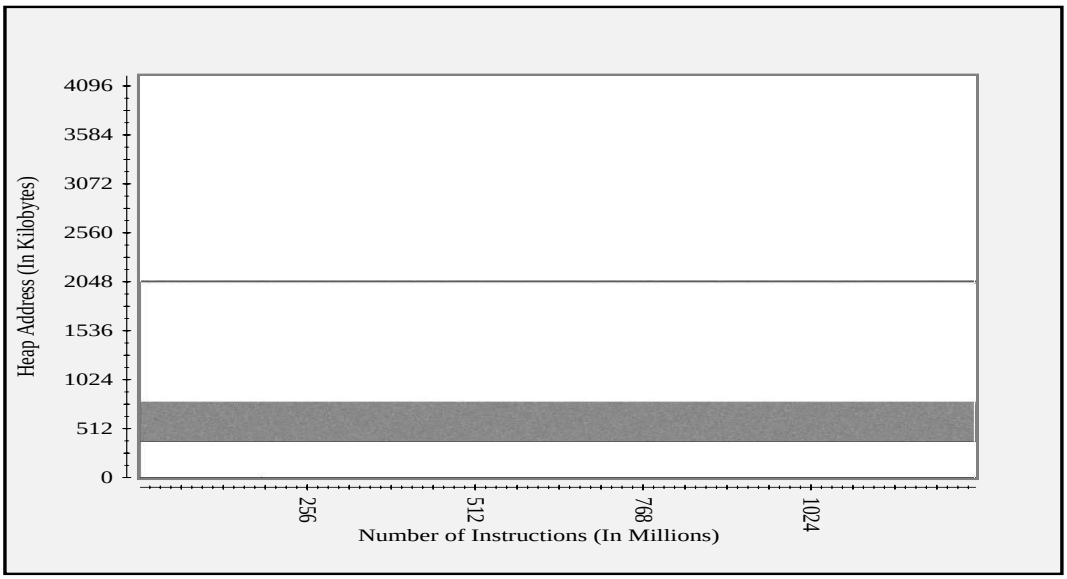

Figure E.30: Memory access plot for Hyper using the first-fit address-ordered no-footer allocator

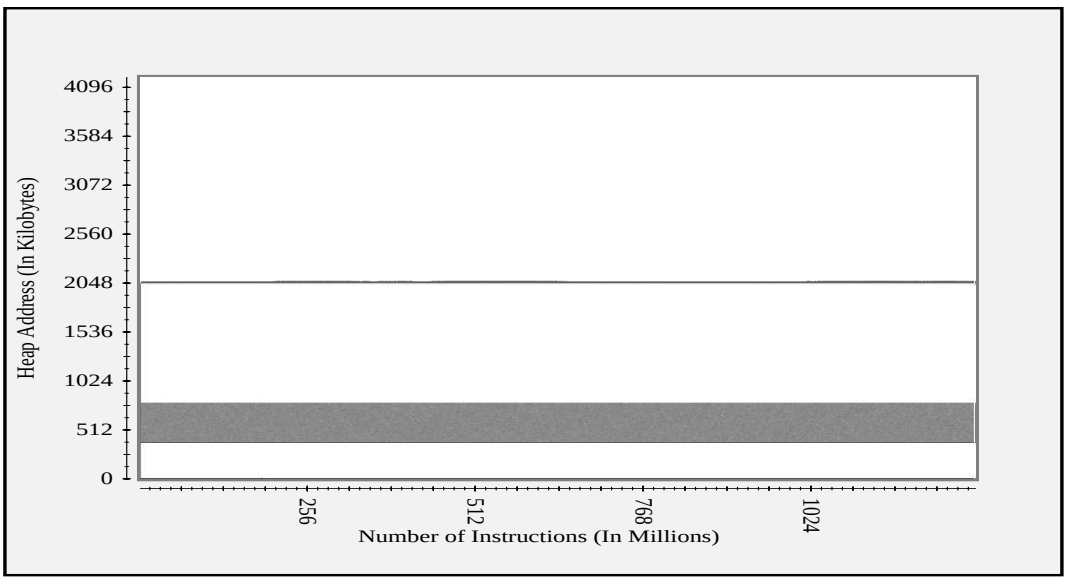

Figure E.31: Memory access plot for Hyper using the first-fit LIFO no-footer allocator

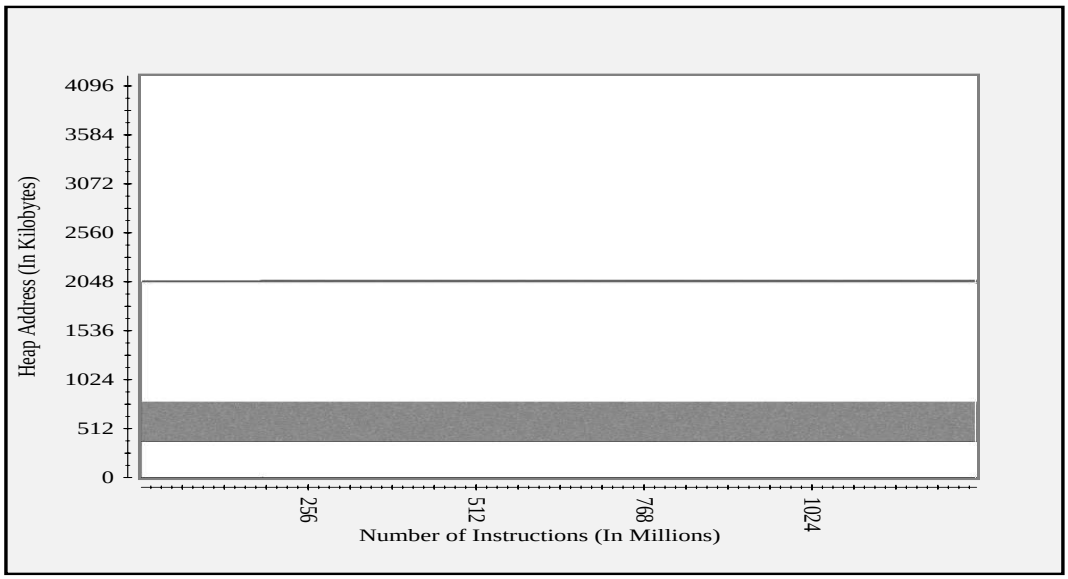

Figure E.32: Memory access plot for Hyper using the half-fit allocator

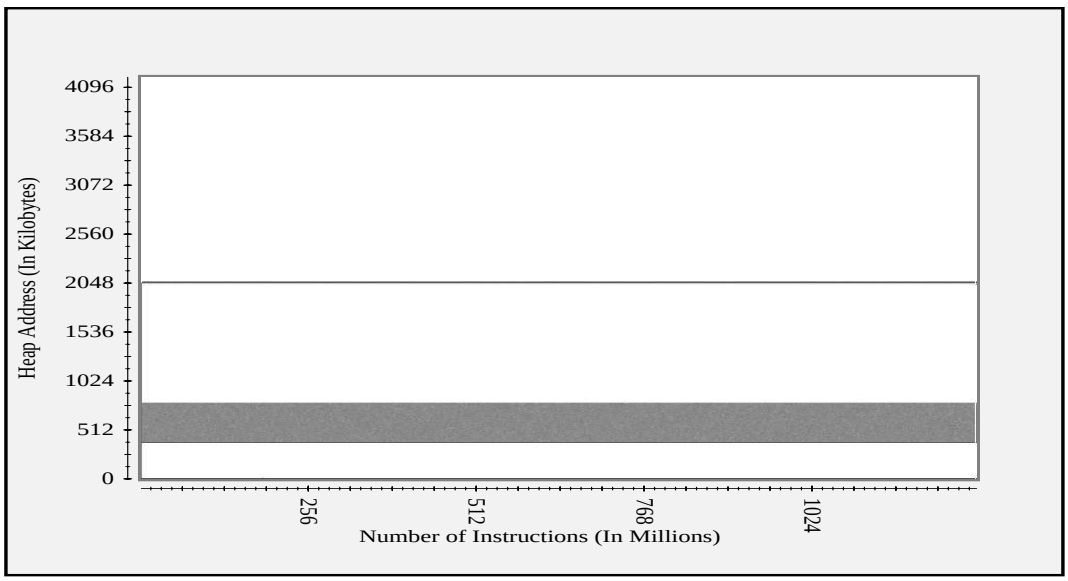

Figure E.33: Memory access plot for Hyper using Lea's 2.6.1 allocator

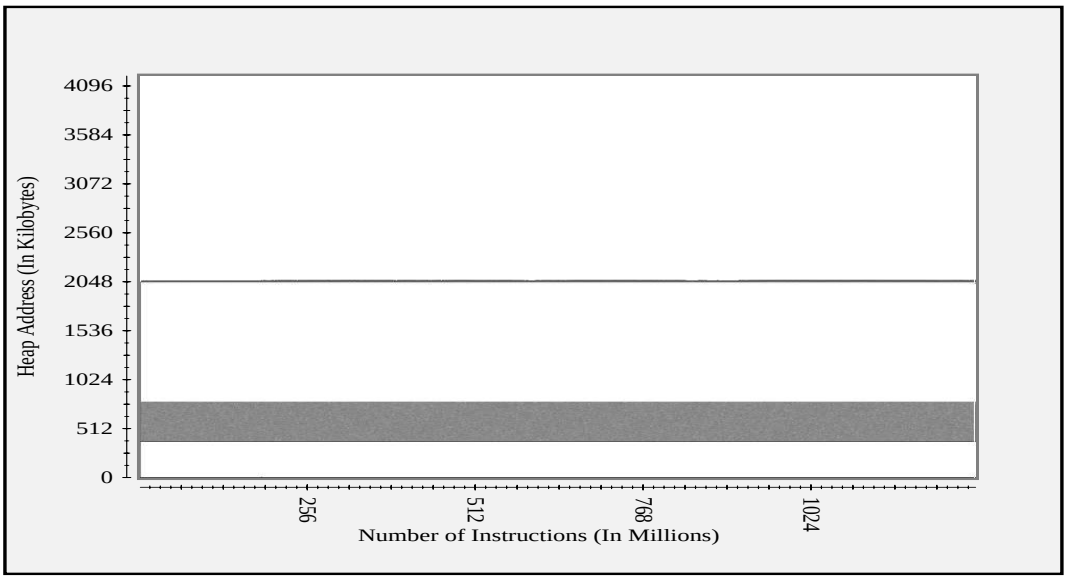

Figure E.34: Memory access plot for Hyper using the next-fit LIFO no-footer allocator

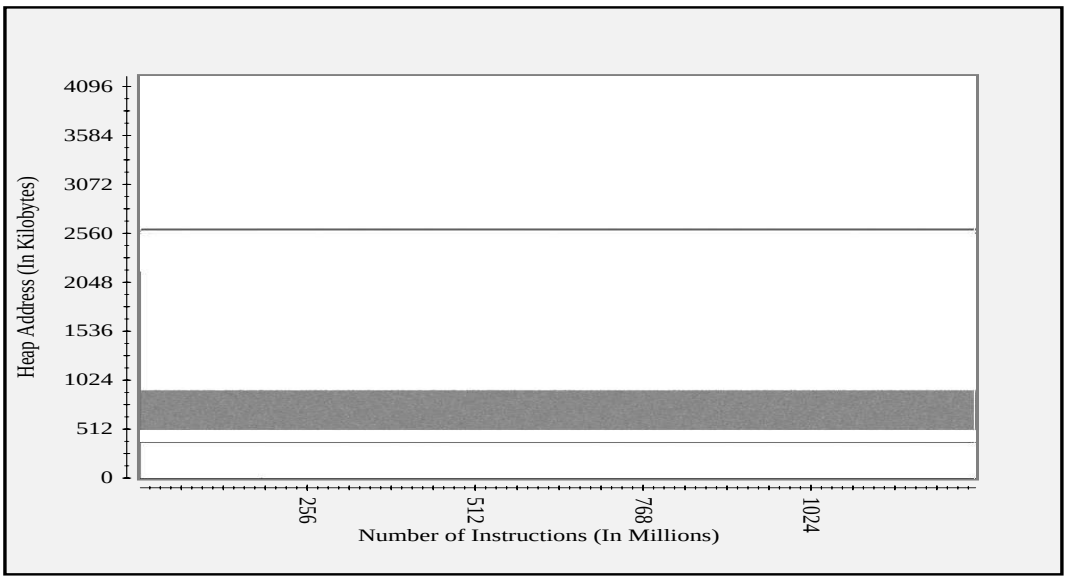

Figure E.35: Memory access plot for Hyper using the simple segregated storage 2^N allocator

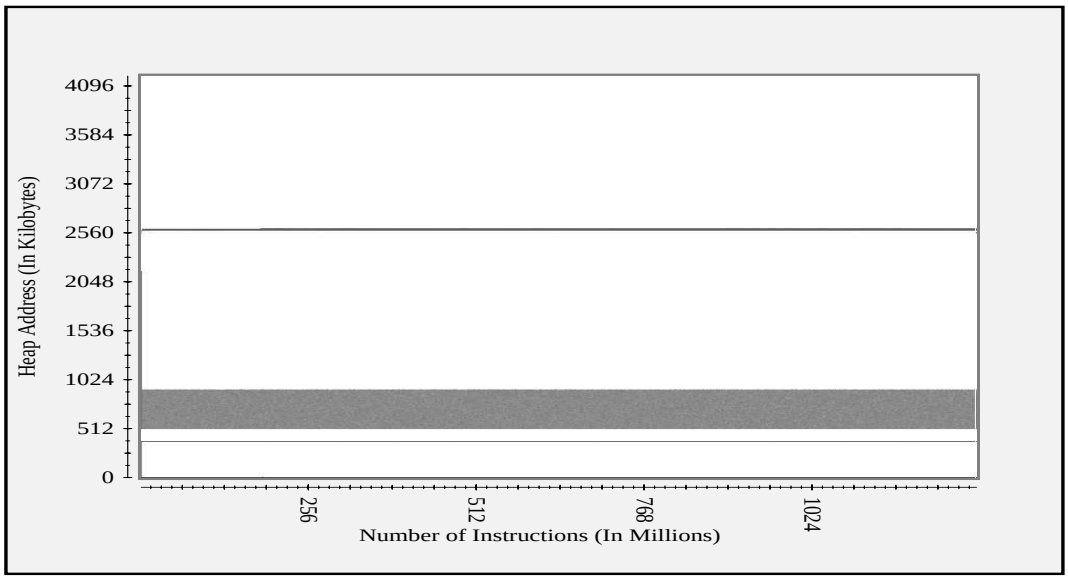

Figure E.36: Memory access plot for Hyper using the simple segregated storage 2^N & $3 * 2^N$ allocator

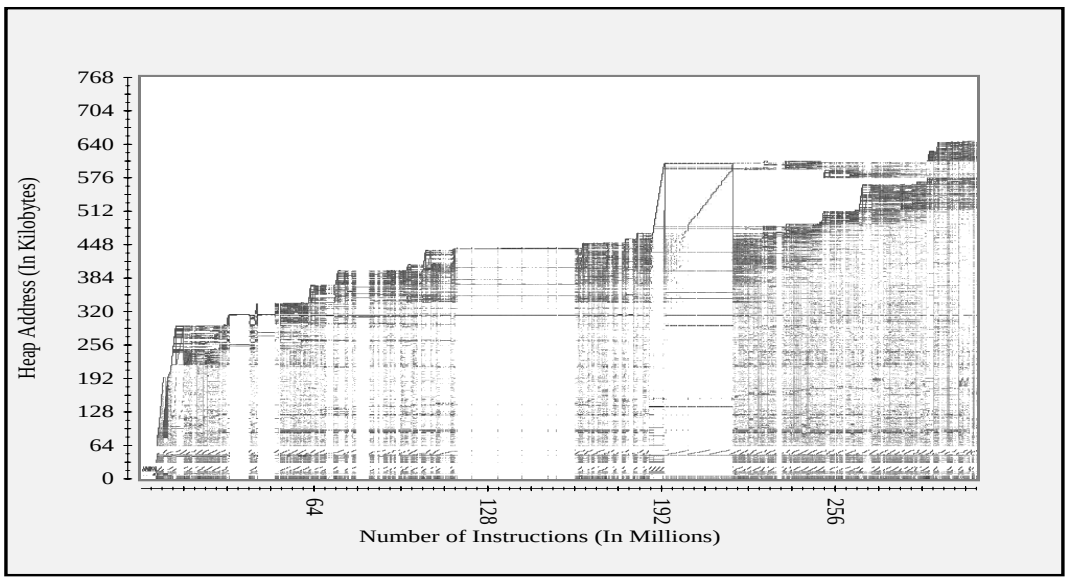

Figure E.37: Memory access plot for P2C using the binary-buddy allocator

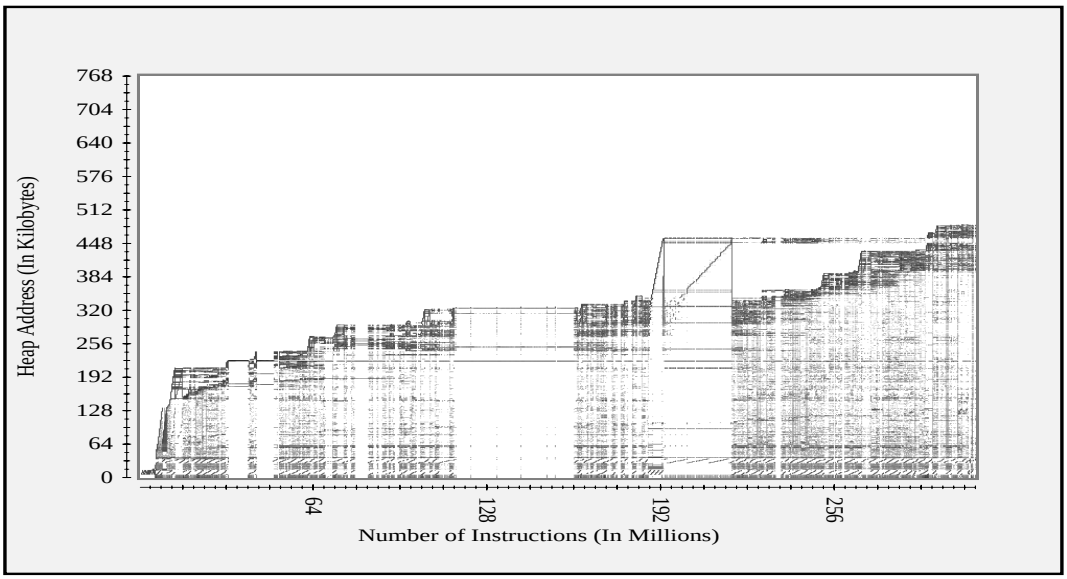

Figure E.38: Memory access plot for P2C using the best-fit LIFO no-footer allocator

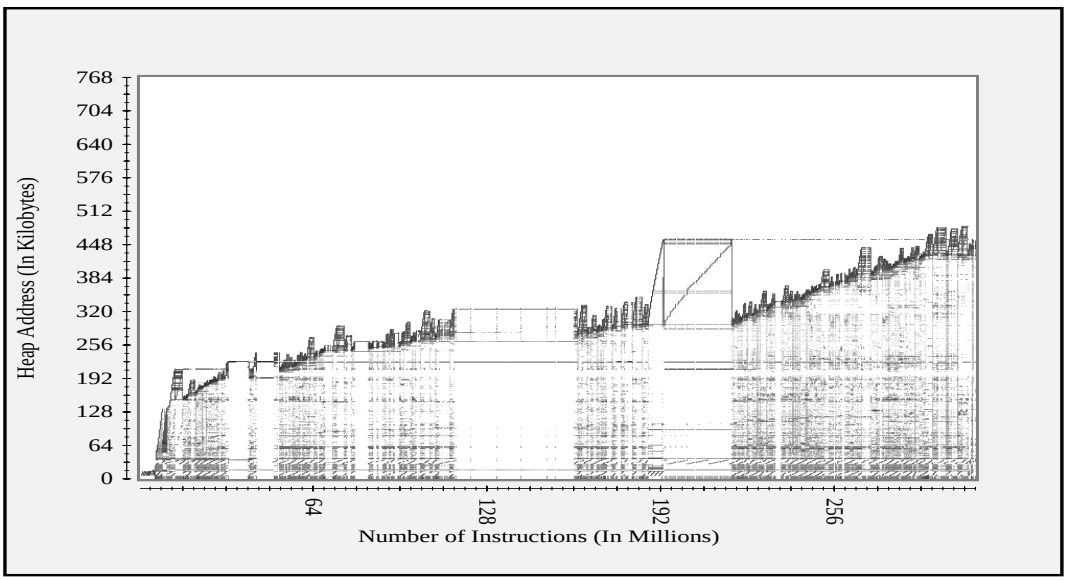

Figure E.39: Memory access plot for P2C using the first-fit address-ordered no-footer allocator

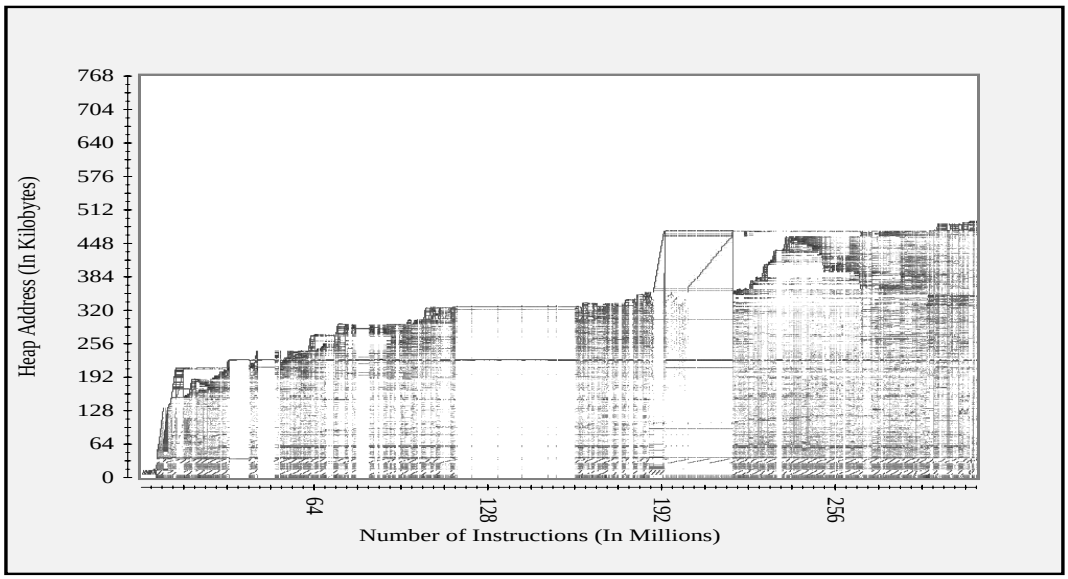

Figure E.40: Memory access plot for P2C using the first-fit LIFO no-footer allocator

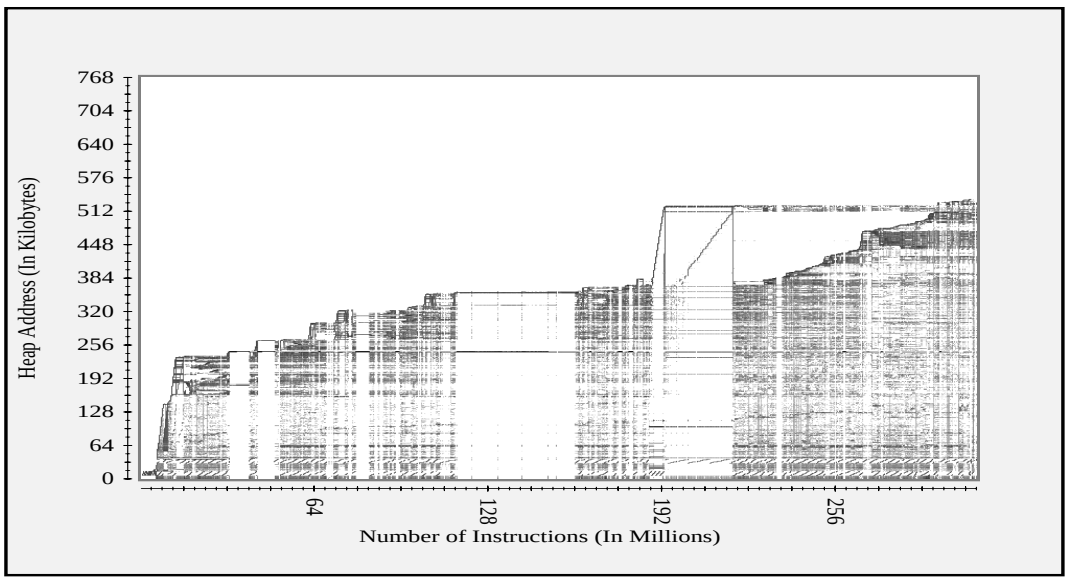

Figure E.41: Memory access plot for P2C using the half-fit allocator

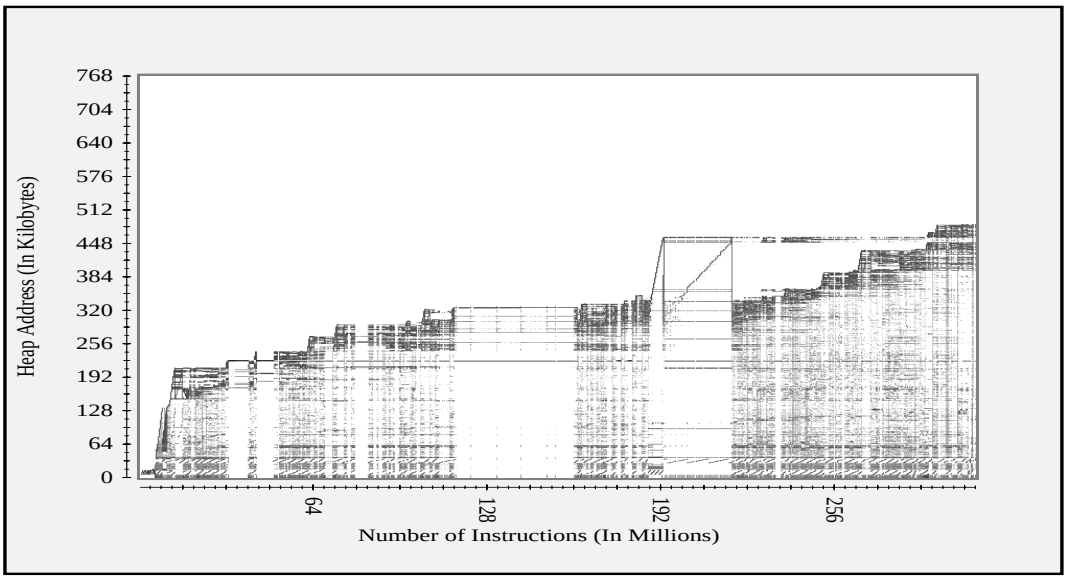

Figure E.42: Memory access plot for P2C using Lea's 2.6.1 allocator

Figure E.43: Memory access plot for P2C using the next-fit LIFO no-footer allocator

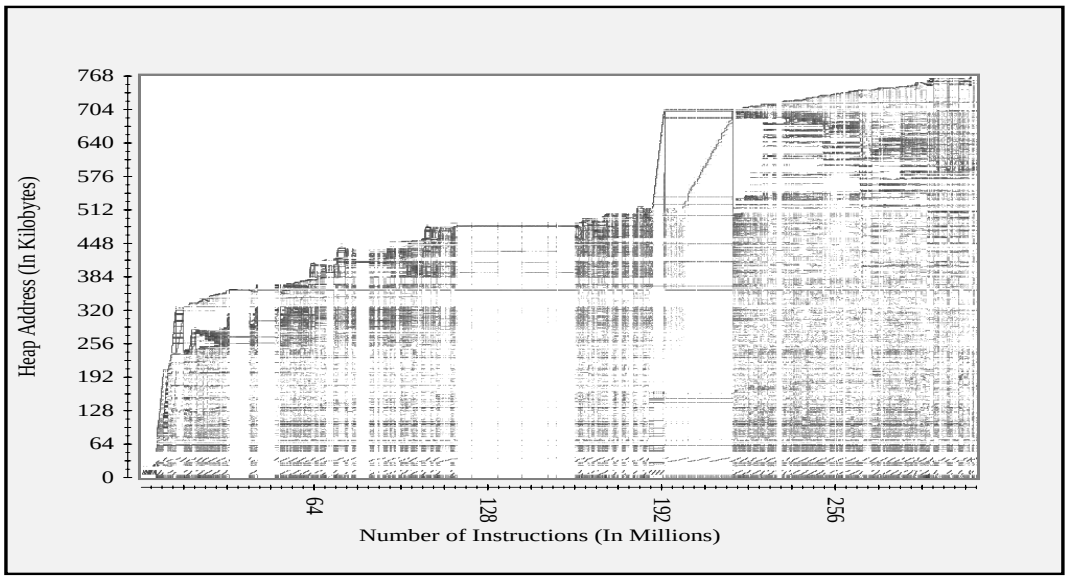

Figure E.44: Memory access plot for P2C using the simple segregated storage 2^N allocator

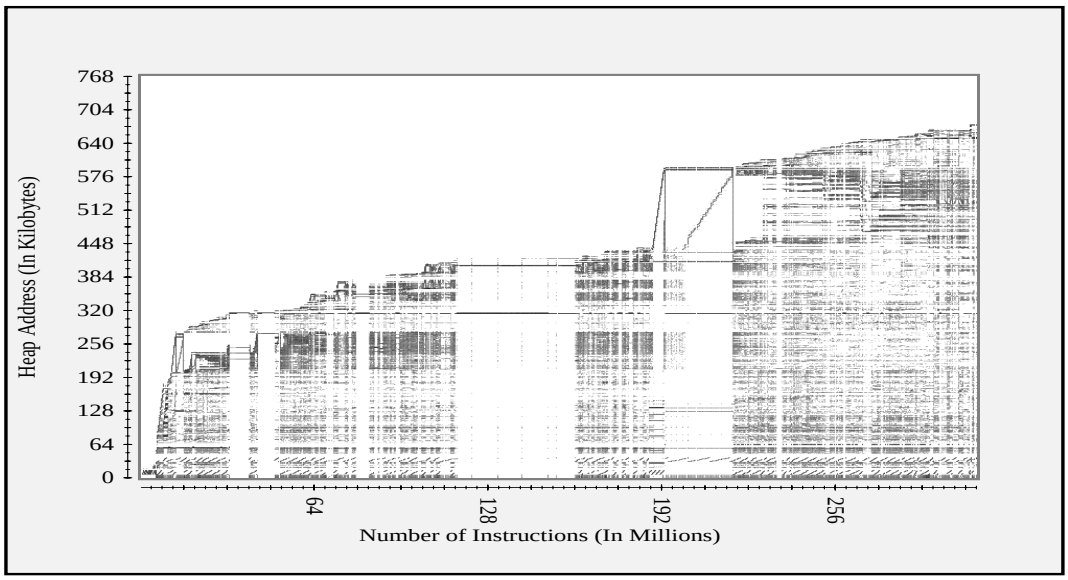

Figure E.45: Memory access plot for P2C using the simple segregated storage 2^N & $3 * 2^N$ allocator

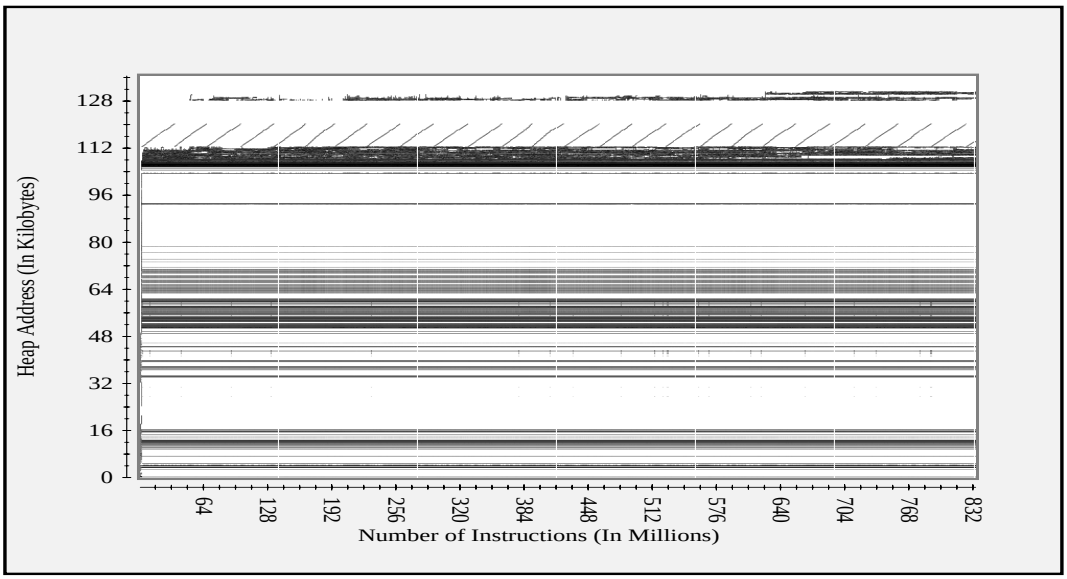

Figure E.46: Memory access plot for Perl using the binary-buddy allocator

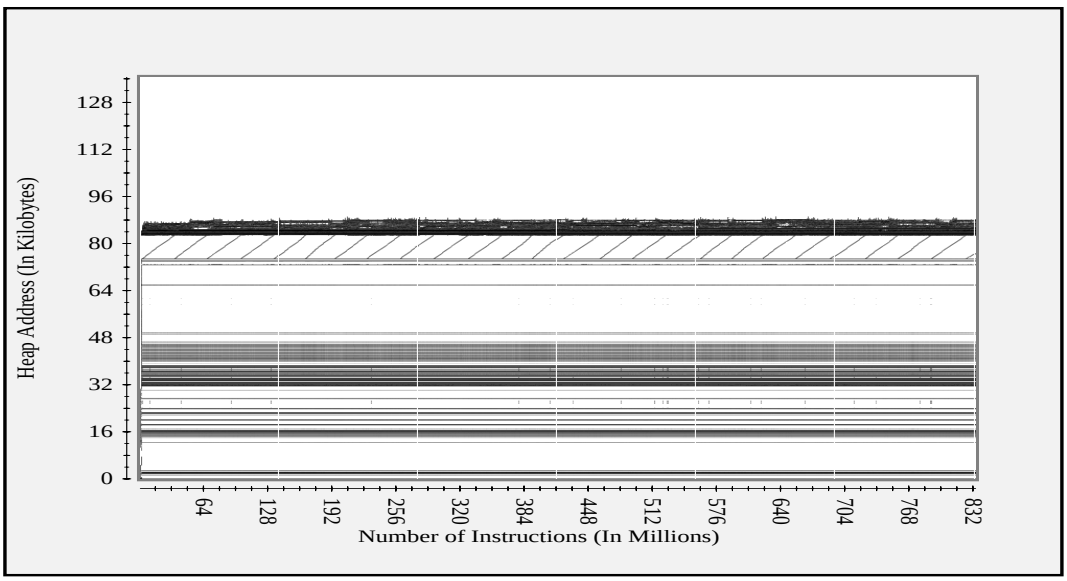

Figure E.47: Memory access plot for Perl using the best-fit LIFO no-footer allocator

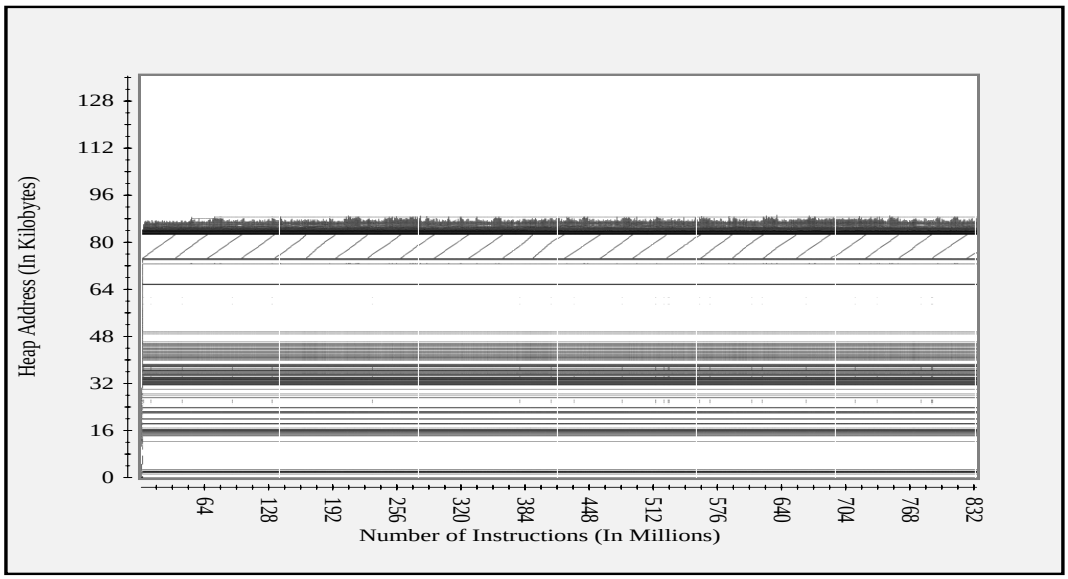

Figure E.48: Memory access plot for Perl using the first-fit address-ordered no-footer allocator

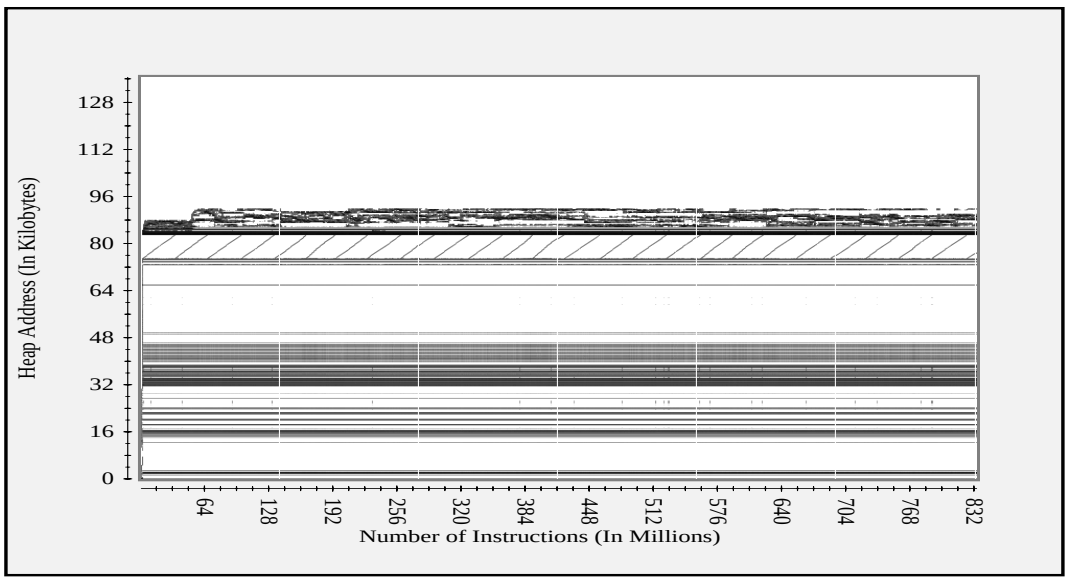

Figure E.49: Memory access plot for Perl using the first-fit LIFO no-footer allocator

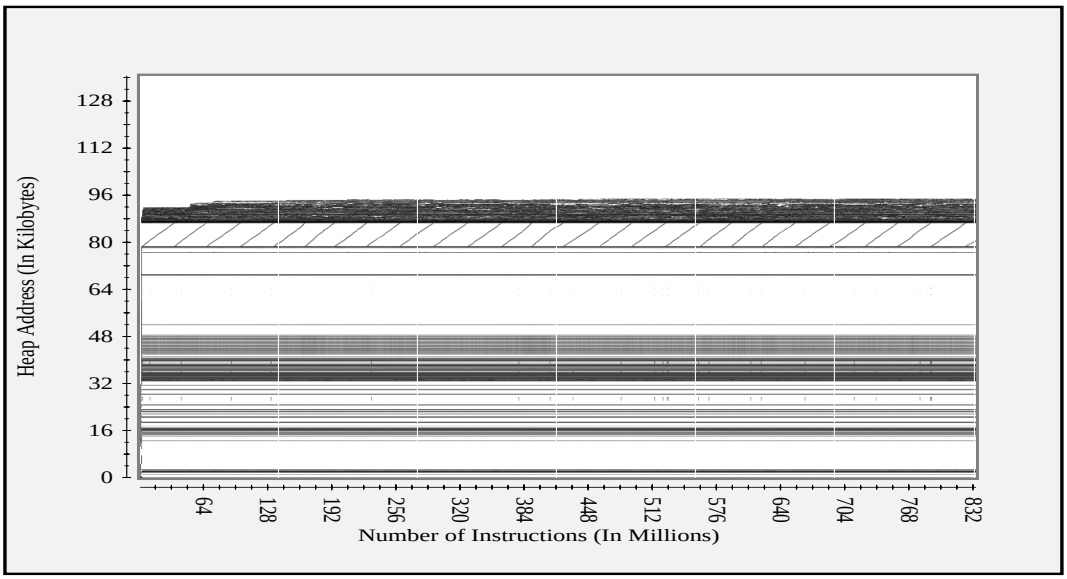

Figure E.50: Memory access plot for Perl using the half-fit allocator

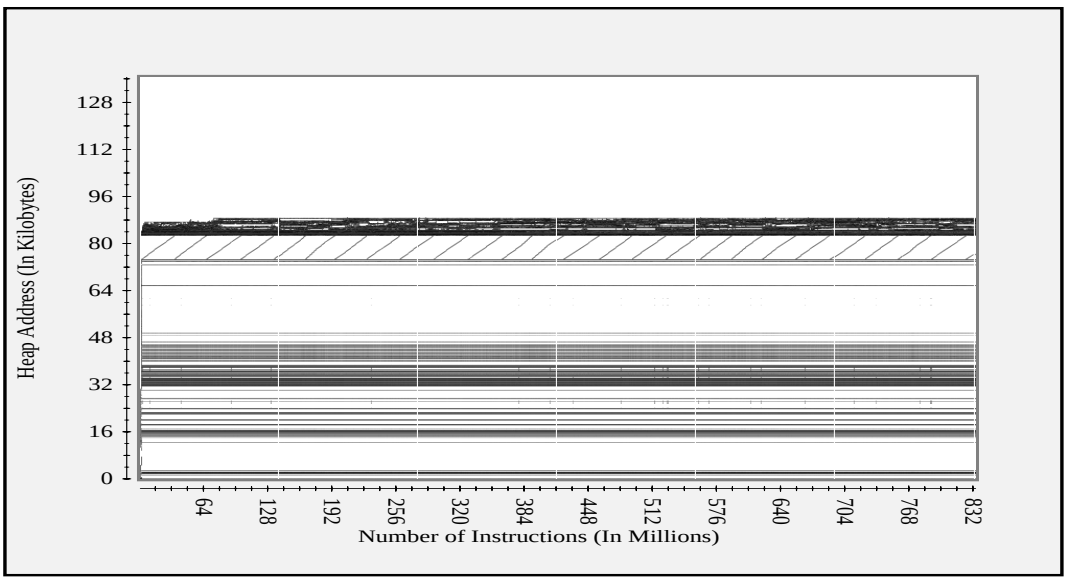

Figure E.51: Memory access plot for Perl using Lea's 2.6.1 allocator

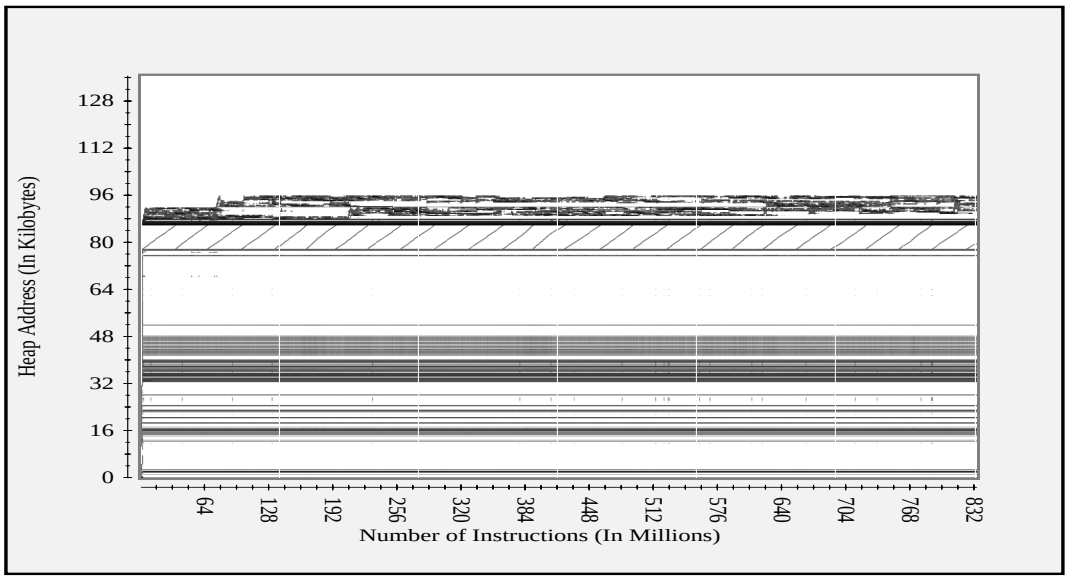

Figure E.52: Memory access plot for Perl using the next-fit LIFO no-footer allocator

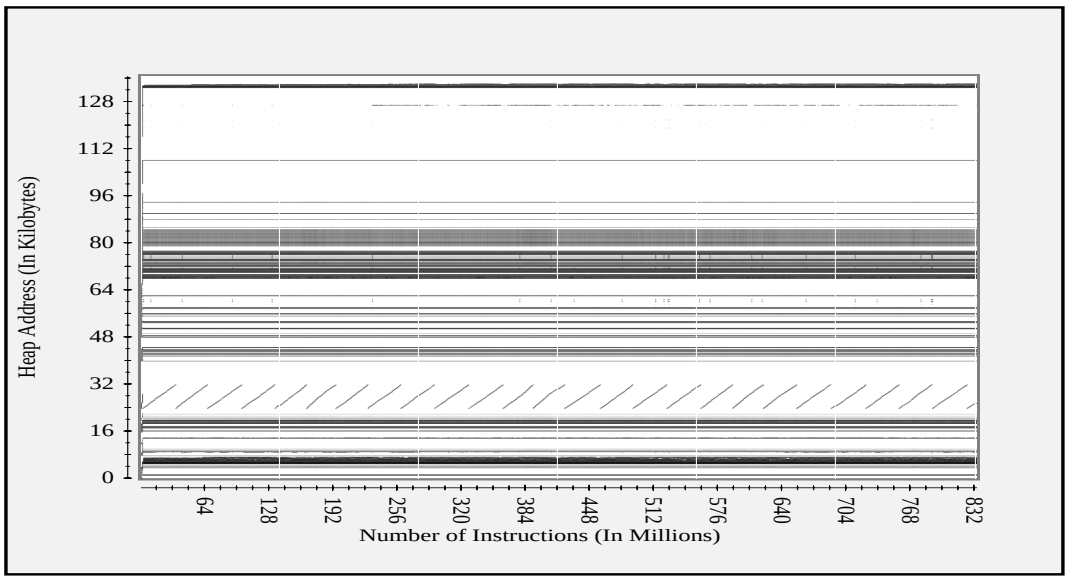

Figure E.53: Memory access plot for Perl using the simple segregated storage 2^N allocator

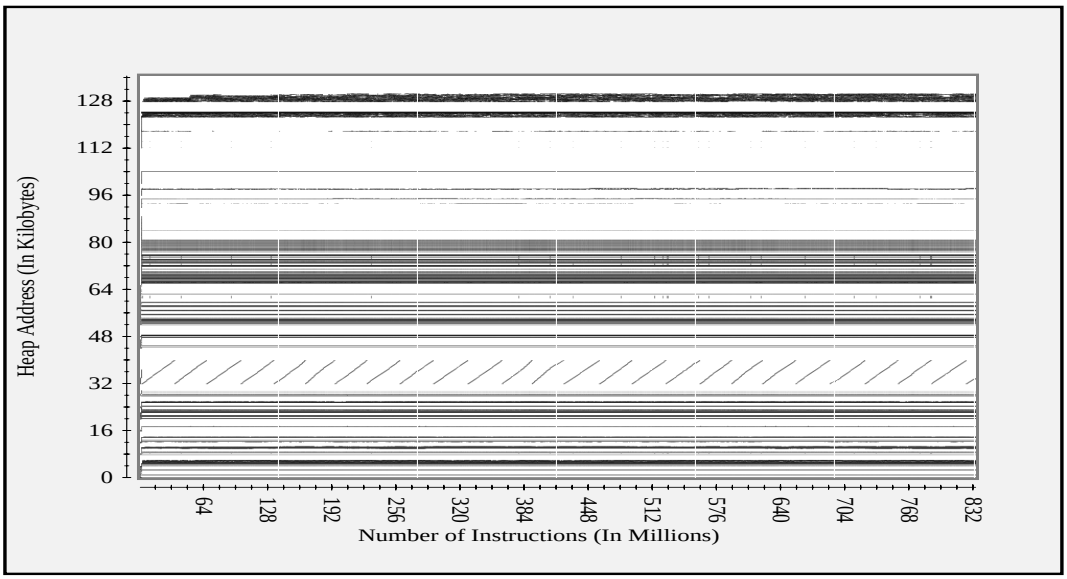

Figure E.54: Memory access plot for Perl using the simple segregated storage 2^N & $3 * 2^N$ allocator