

Fault Tolerance for Free

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Fault Tolerance for Free

- What exactly do we mean, “for free?”
- Fault tolerance has been considered too expensive:
 - Requires too many computing resources
 - Too hard to add to arbitrary applications (and maintain)
- Multi-★ systems are now commonplace and relatively cheap
- Difficulty of programming and maintenance is now the real cost

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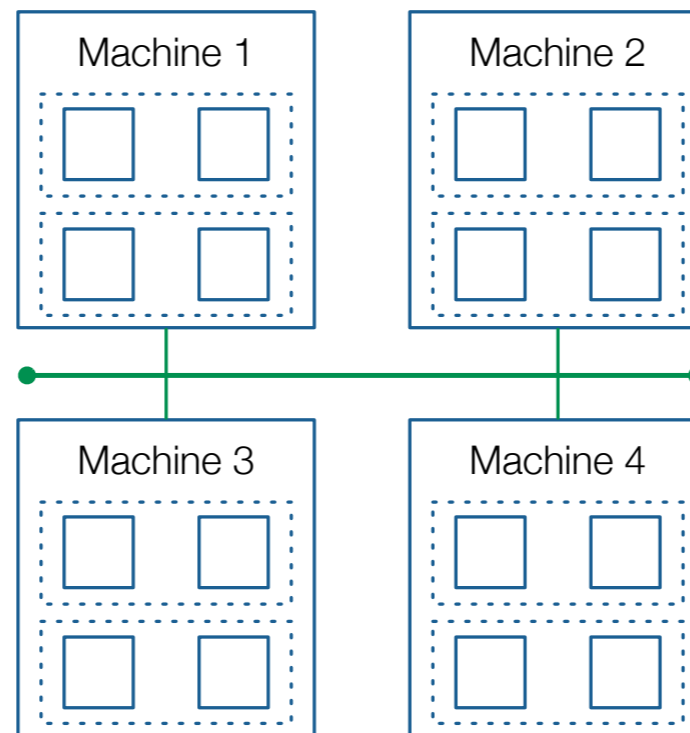
Our goal is to eliminate programming cost by adding fault tolerance automatically to any application

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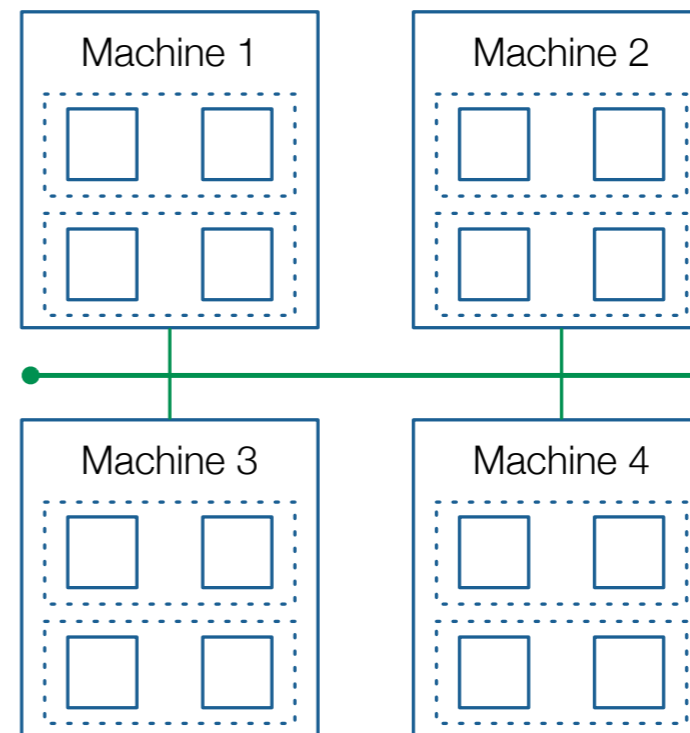
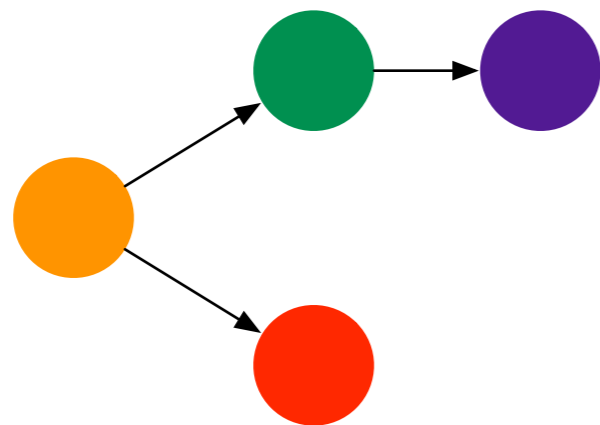
Freedom through Lagniappe

- Lagniappe is a programming environment and runtime system
- Target high-performance, request-processing applications
- Lagniappe maps applications to multi-★ hardware
- Adapts mapping with changes in workload and resource availability
- Key insight: interface for adaptation = interface for FT replication
- Programmers provide no more information than is already there

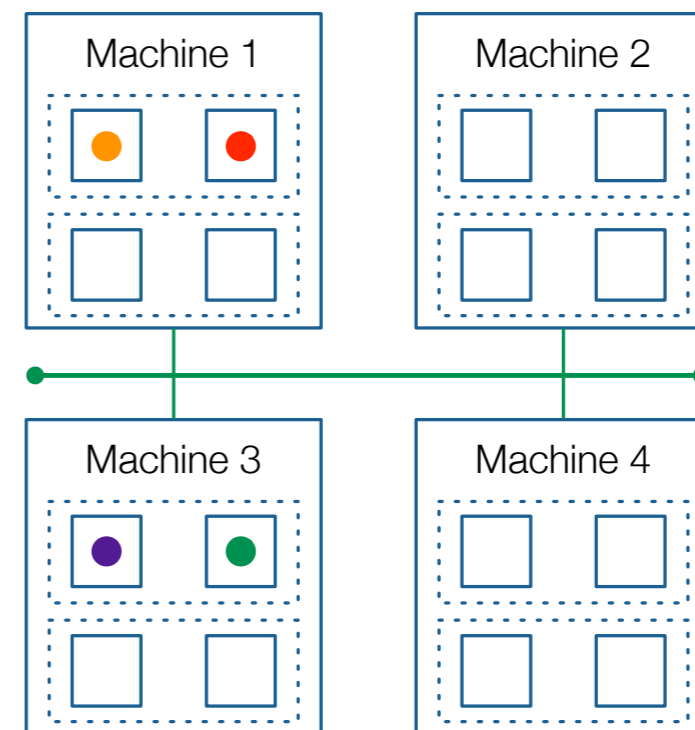
Adaptation Example



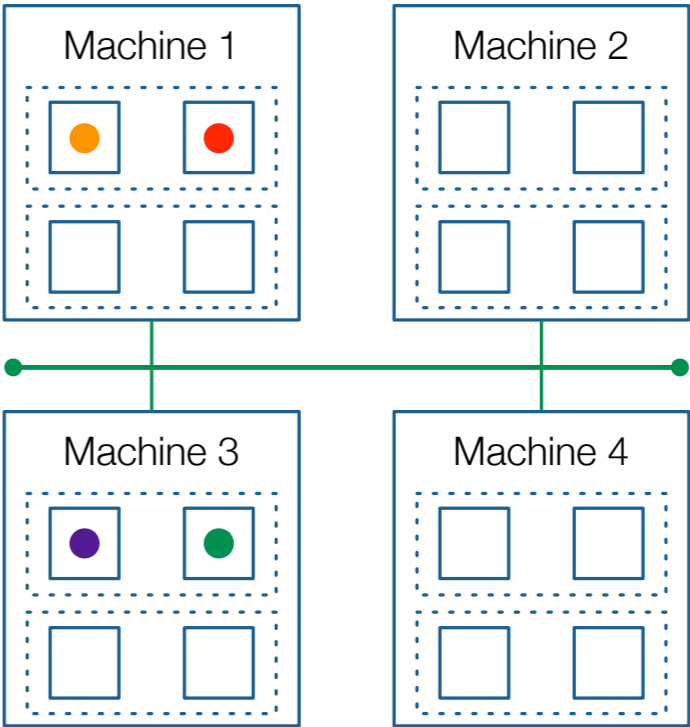
Adaptation Example



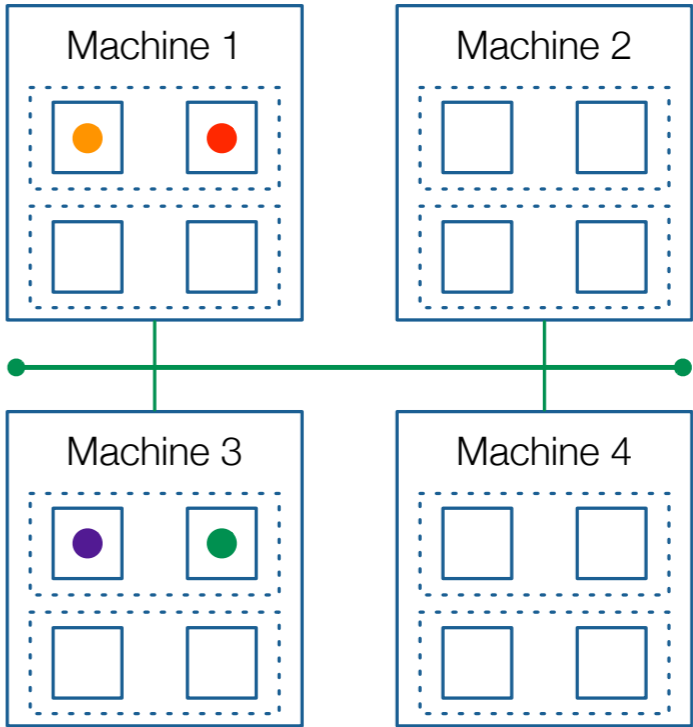
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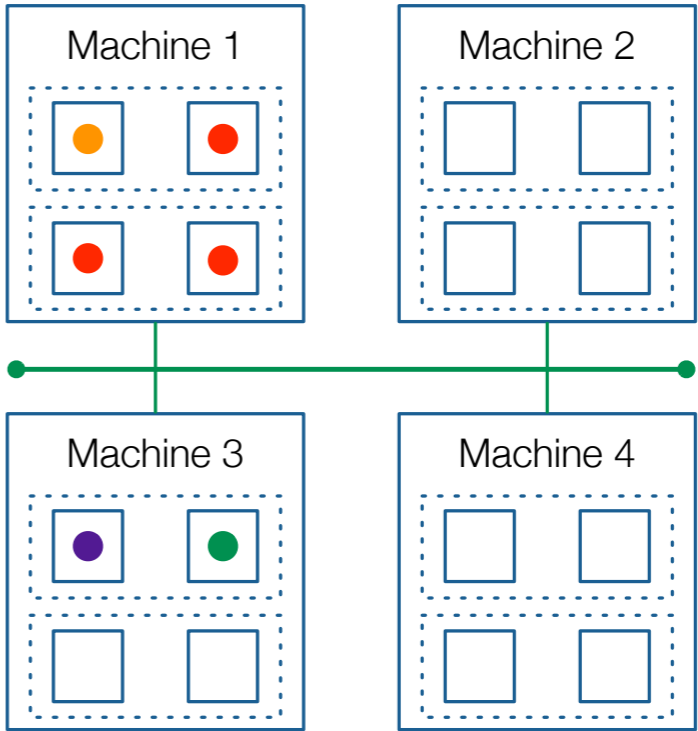
Adaptation Example



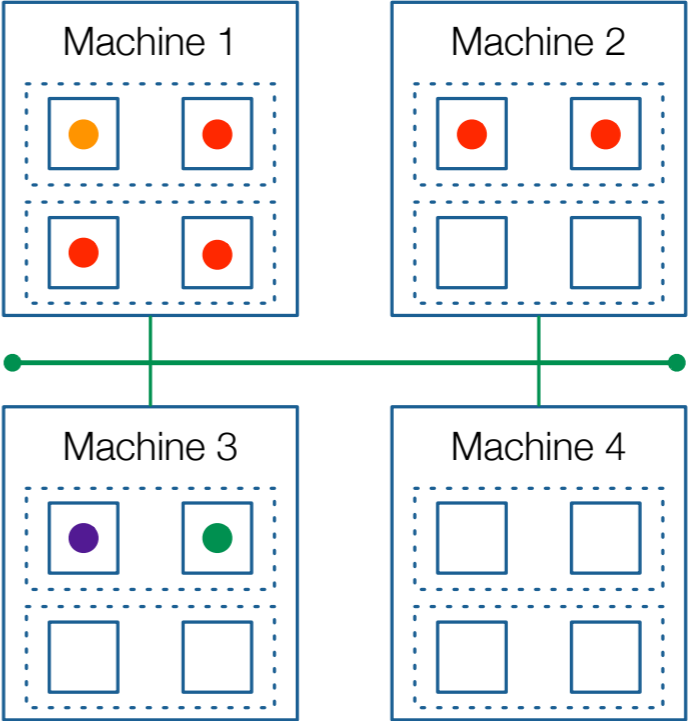
Adaptation Example



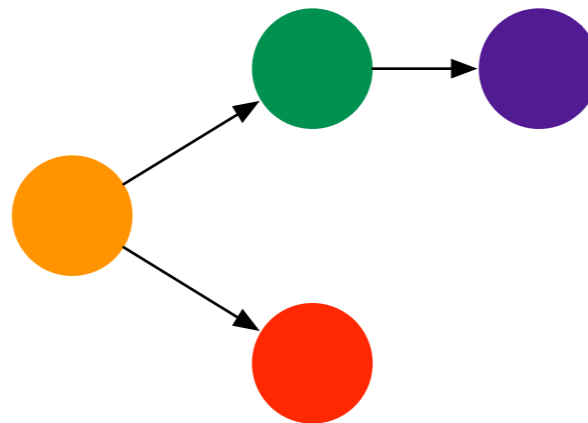
Adaptation Example



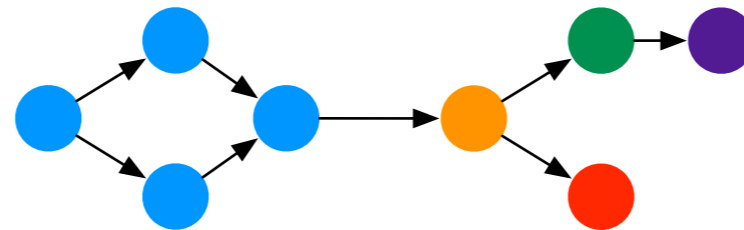
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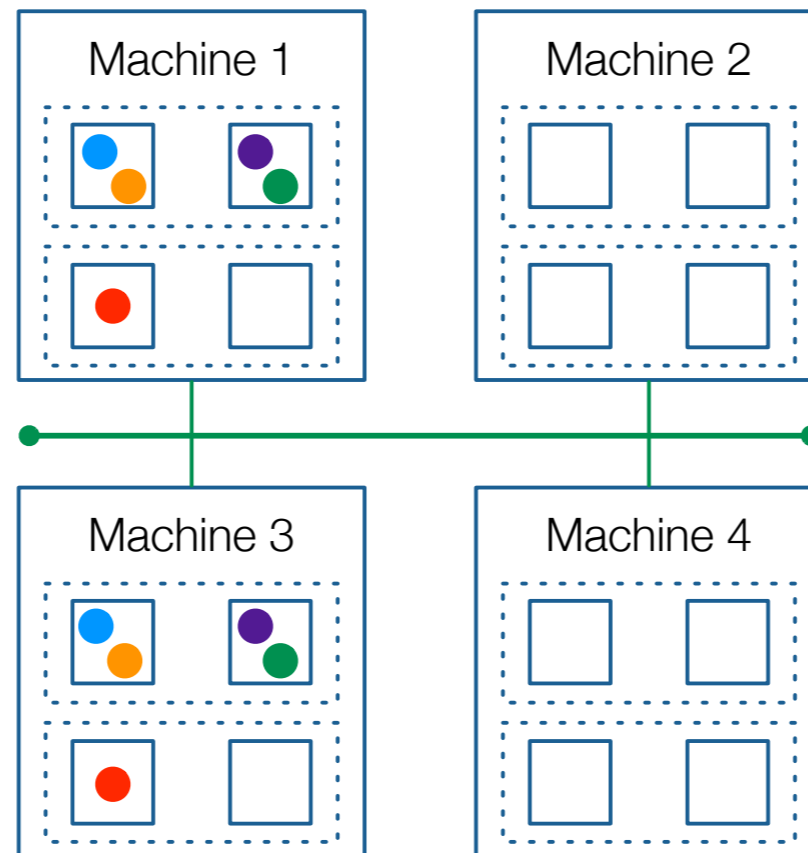
Lagniappe Fault Tolerance



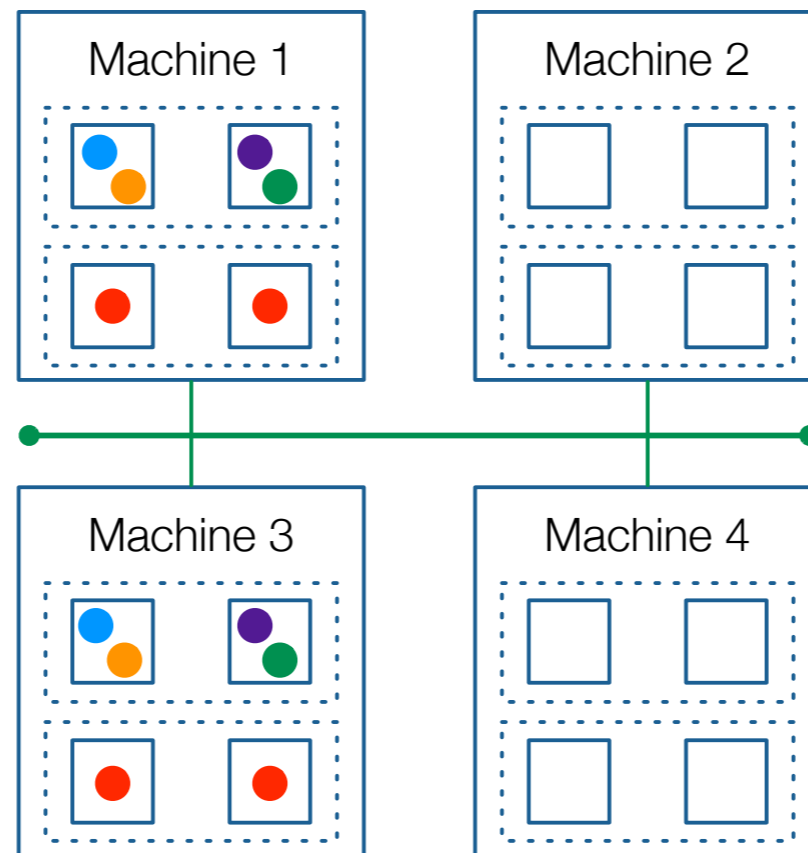
Lagniappe Fault Tolerance



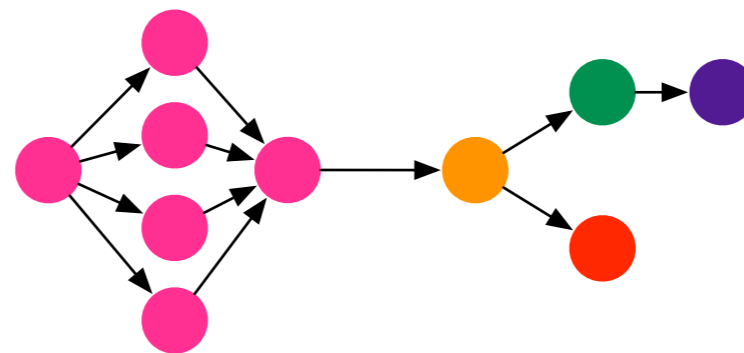
Lagniappe Fault Tolerance



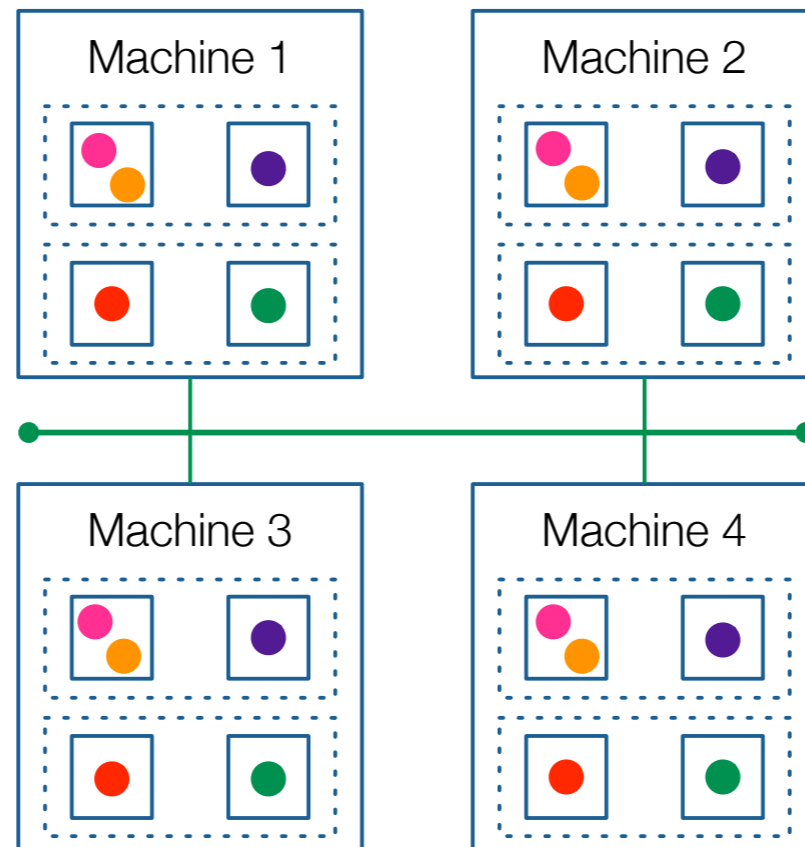
Lagniappe Fault Tolerance



Lagniappe Fault Tolerance



Lagniappe Fault Tolerance



So what?

- Automatically provide fault tolerance to any request processing application
- Eliminate the true cost of fault tolerance: programming and maintenance
- Lagniappe exists: <http://www.cs.utexas.edu/users/riche/lagniappe>
- Currently building in the Lagniappe environment:
 - Fault-tolerance protocols
 - A library of applications

Thanks!