Model checking in the cloud
FMCAD 2012

www.onespin-solutions.com

Sweet spots for “cloud” model checking

- Checking automatically generated assertions
  - Often ~10K assertions generated for connectivity, register checks, X propagation checks
  - Individual assertions relatively easy
  - Running in parallel on virtual infrastructure
  - May quickly find issues
- Hunting for counterexample
  - Use cloud parallelism to find deeper counterexamples
  - No solution to state space explosion
  - But: may be difference between uncertain result and finding counterexample in reasonable time
- (?) Proving assertions

Adoption hurdles

- Secrecy of data
  - Typical design house policy is that designs stay in intranet
  - General acceptance of “cloud” as part of intranet required
    - Ideally, all data can be processed in cloud
    - Pragmatically, many design houses will only allow non-critical data to go to off-site “cloud” – even if cloud provider ensures data cannot get out of the cloud unencrypted

Licensing

- Feature based licensing
  - Traditional EDA license model
  - Buy #number of features upfront for a timeslot
  - Can use up to #number features in that timeslot
  - No difference between license usage of 0% and 100%
- Pay-per-use
  - Traditional cloud license model
  - Only pay what you use
  - Relatively cheap to use 1000 parallel instances for 10 minutes
  - Crucial for acceptance of model checking in the cloud

Impact of “cloud” on acceptance of formal

- Automatically generated checks
  - Require no or little user input
  - Enjoy wider acceptance than interactive formal
  - Huge parallelism of “cloud” allows to efficiently run without gigantic compute resources in own network
  - May be really attractive to FPGA companies
- Once benefit of automatically generated assertions is seen, user-written assertions may see wider adoption
- In case of major benefit of cloud computing for proving assertions, formal may see wider adaption