



J-Spring

16 april 2008 Spant! - Bussum



Grid Computing with Gridgain

Jos Dirksen
Marcel Soute





Presentation Goal

“Introduce you to the concepts of grid computing and show you how easy it is to grid enable java applications with GridGain”





Agenda

- **Introduction**
- What is Grid Computing?
- What is GridGain?
- Demo
- GridGain's Advanced features
- Q&A

“GRID COMPUTING MADE EASY”





Who are we?



- Jos Dirksen, Software Architect
 - Focus on:
 - integration, open source, middleware, SOA
- Marcel Soute, Application Developer
 - Focus on:
 - integration, grid computing, build environments
- Both work for Atos Origin



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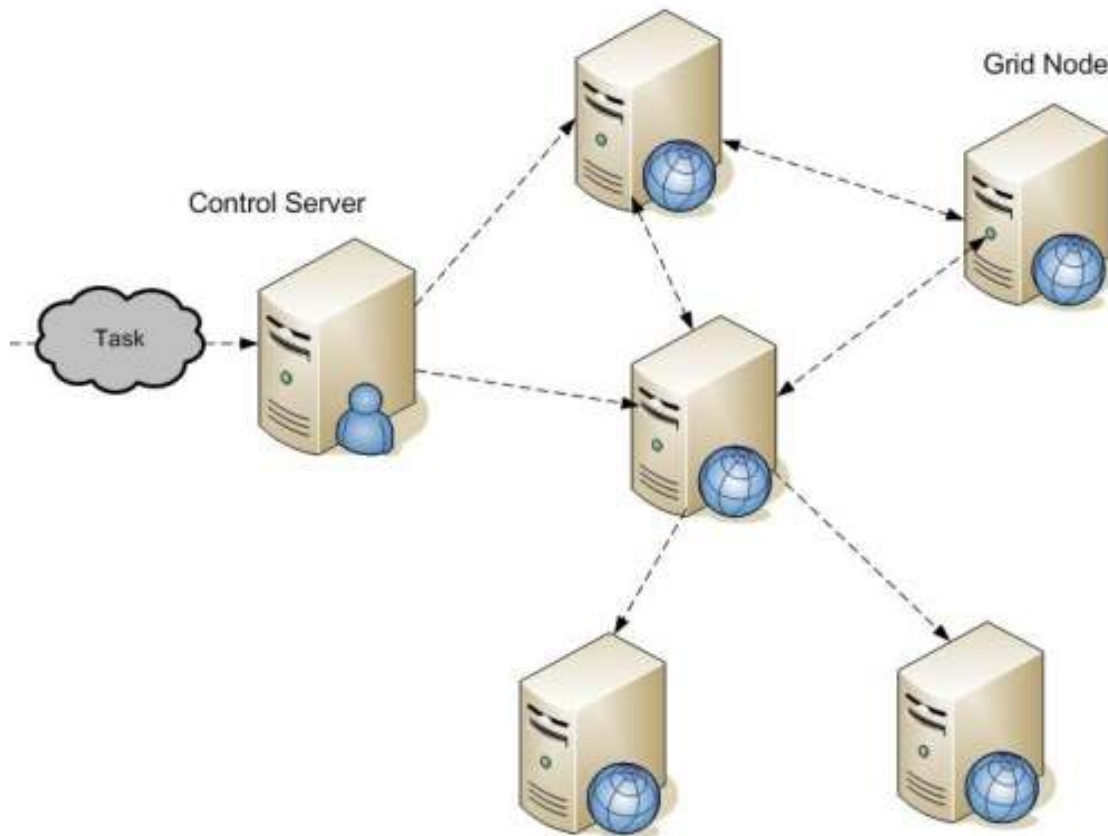


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What is grid computing?





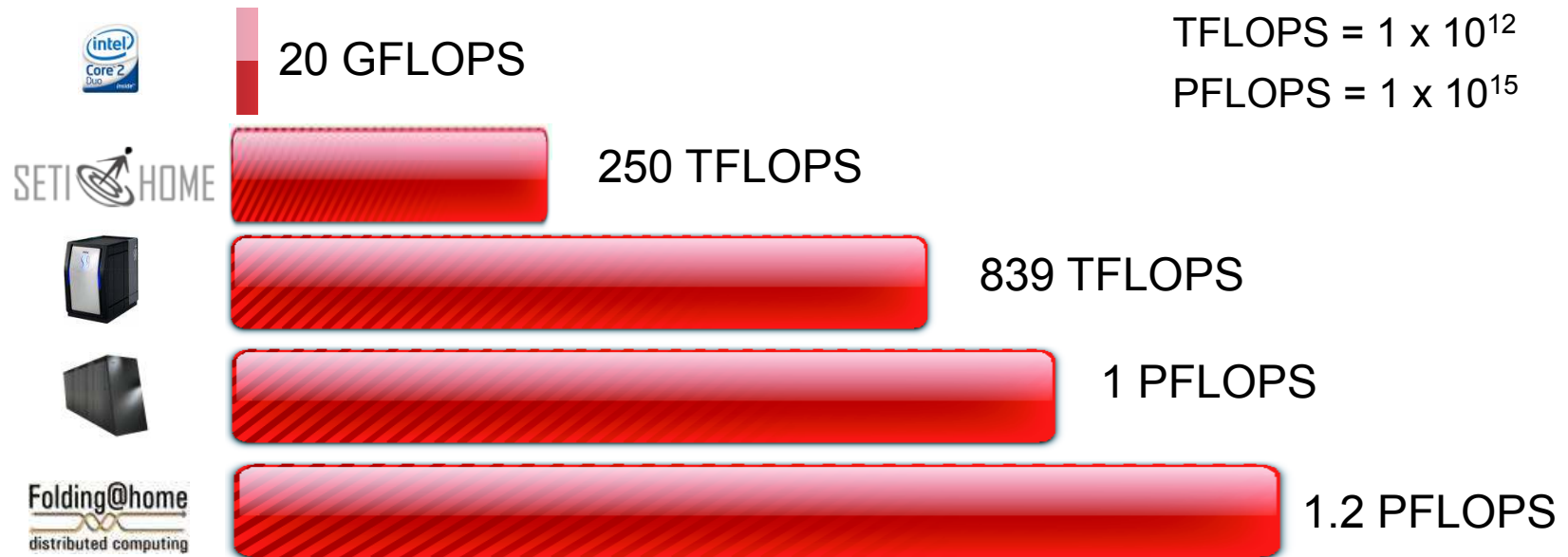
What is Grid computing?

- Compute grids: distribution of jobs
 - Earthquake Simulation, Seti@Home, Distributed.Net
- Data grids: distribution of data
 - P2P, GoogleFS
 - Oracle Grid, JBoss Cache etc..
- Not just for science:
 - Sun Grid, Amazon EC2, Google, ebay etc.





Why grid computing?



- Relatively cheap grids with commodity hardware



How to use grid computing ?

- Grid computing is complex



- Infra:

- Communication, failover, network etc..

- Programming:

- Threads, splitting tasks, combining results etc..

- Map Reduce paradigm



- Research from google

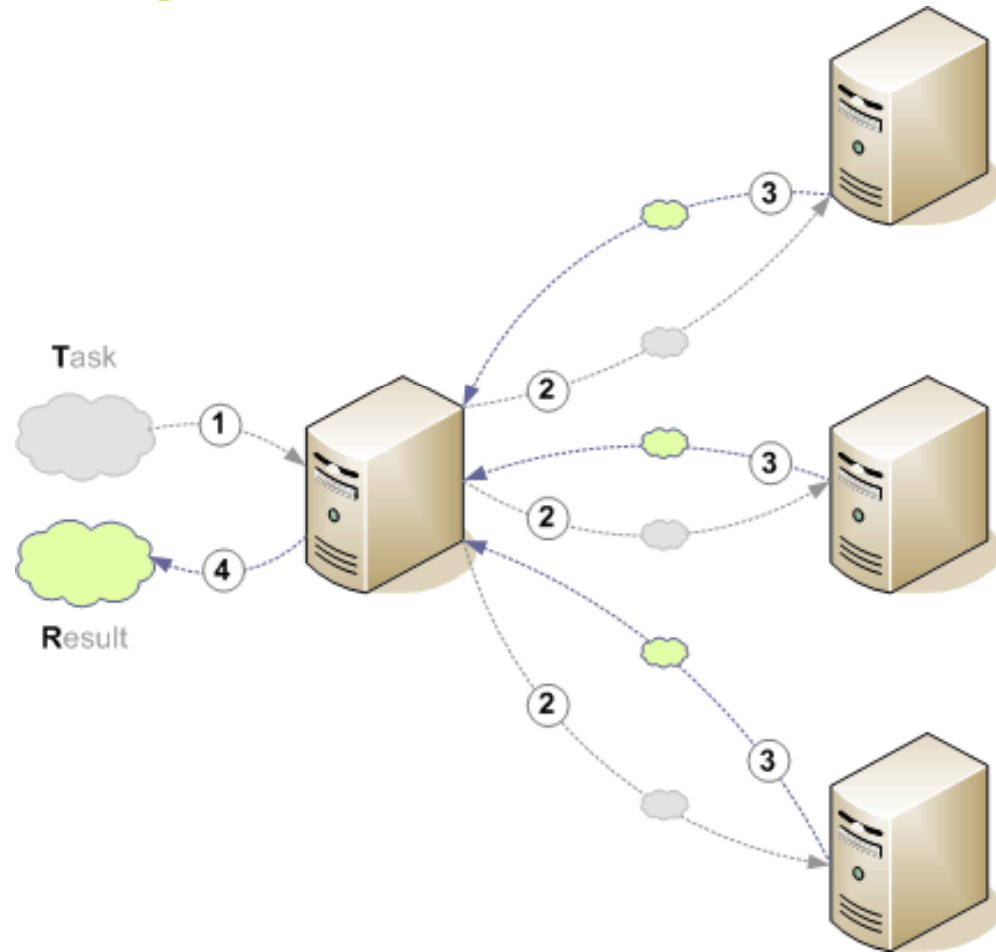
- terracotta, hadoop, gridgain etc...





What is Map Reduce?

1. Task request
2. Split tasks (map)
3. Results
 - Combine results (reduce)



<http://labs.google.com/papers/mapreduce-osdi04.pdf>





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Gridgain: Core features

- Open Source library for grid computing
- Hides the complex grid issues:
 - Communication, failover, timeouts etc..
- Use Map/Reduce pattern: GridTask
 - Implement the map and reduce methods
 - GridGain handles the distribution to the nodes
- @gridify annotation



GridGain's Map/Reduce: GridTask

```
public class MyTask extends GridTaskAdapter<String, String> {  
  
    @GridLoadBalancerResource    // Resource injection  
    GridLoadBalancer balancer;  
  
    public Map<? extends GridJob, GridNode>  
        map(List<GridNode> subgrid, String arg) throws GridException {  
        // assign jobs to a gridNode  
        return jobs;  
    }  
  
    public String reduce(List<GridJobResult> results)  
        throws GridException {  
        // process all the job results received from the nodes  
        return buf.toString();  
    }  
}
```



GridGain's Map/Reduce: GridJob

```
public class MyJob extends GridJobAdapter<Serializable> {  
  
    @GridTaskSessionResource  
    private GridTaskSession ses = null;  
  
    @Override  
    public Serializable execute() throws GridException {  
        return found;  
    }  
}
```



Gridgain: Deployment

- On demand classloading
 - **No need to copy jars**
 - **No need to restart nodes for new tasks**
- Can run multiple nodes locally
- Just a JVM and GridGain libraries needed
- Also possible to deploy application as GAR



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Demo 1: GridGain helloworld

- Start GridGain on multiple nodes
- Show HelloWorld executed on multiple nodes
- Shows usage of gridgain annotation





Demo 2: Password Cracker

- Shows a computational heavy task
- Show GridGain's Map/Reduce paradigm
- Distribute the work to the ad-hoc grid
- Shows how easy GridGain is to use





Demo 3: Distributed Unit test

- Decrease the time it costs to run tests
- Shows JUnit being executed on multiple nodes





Demo 4: Gridify SunFlow

- SunFlow is a java based renderer
- There is an add-on to grid enable SunFlow
- Doing the same in three lines of code!
-which not necessarily makes it faster





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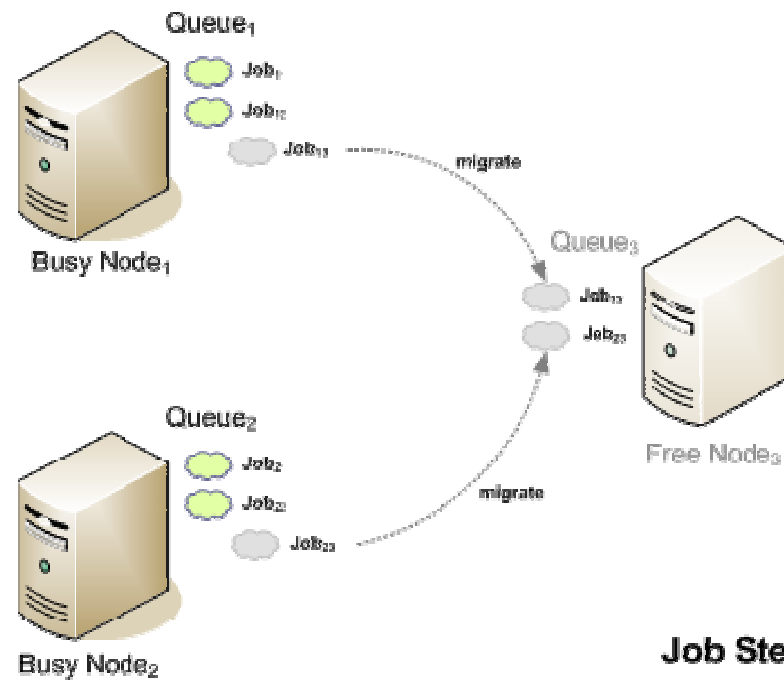
Load Balancing

- Adaptive Load Balancing
 - Probes: CPU, benchmark, processing time, queue
- Affinity Load Balancing
 - Used together with distributed cache
- Round Robin Load Balancing
 - Sequentially call the next node
- Weighted Random Load balancing
 - Distribute jobs randomly



Grid Job Failover

- Grid Always Failover
- Grid Job Stealing Failover



Job Stealing



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Questions?

- Any questions?
 - jos.dirksen@atosorigin.com
 - marcel.soute@atosorigin.com
- More information:
 - <http://www.gridgain.com>
 - <http://www.gridgainsystems.com:8080/wiki>





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Thank you!