



J-Spring

16 april 2008 Spant! - Bussum



Grid Computing with Gridgain

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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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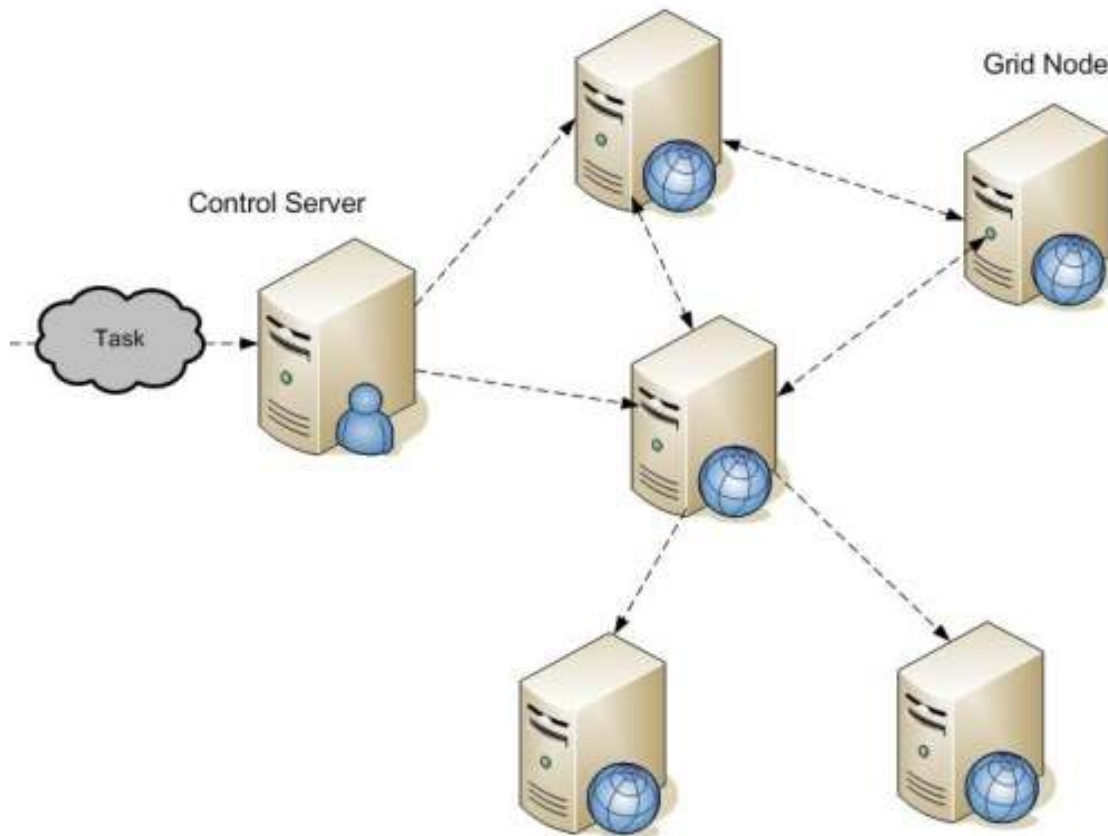


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What is grid computing?





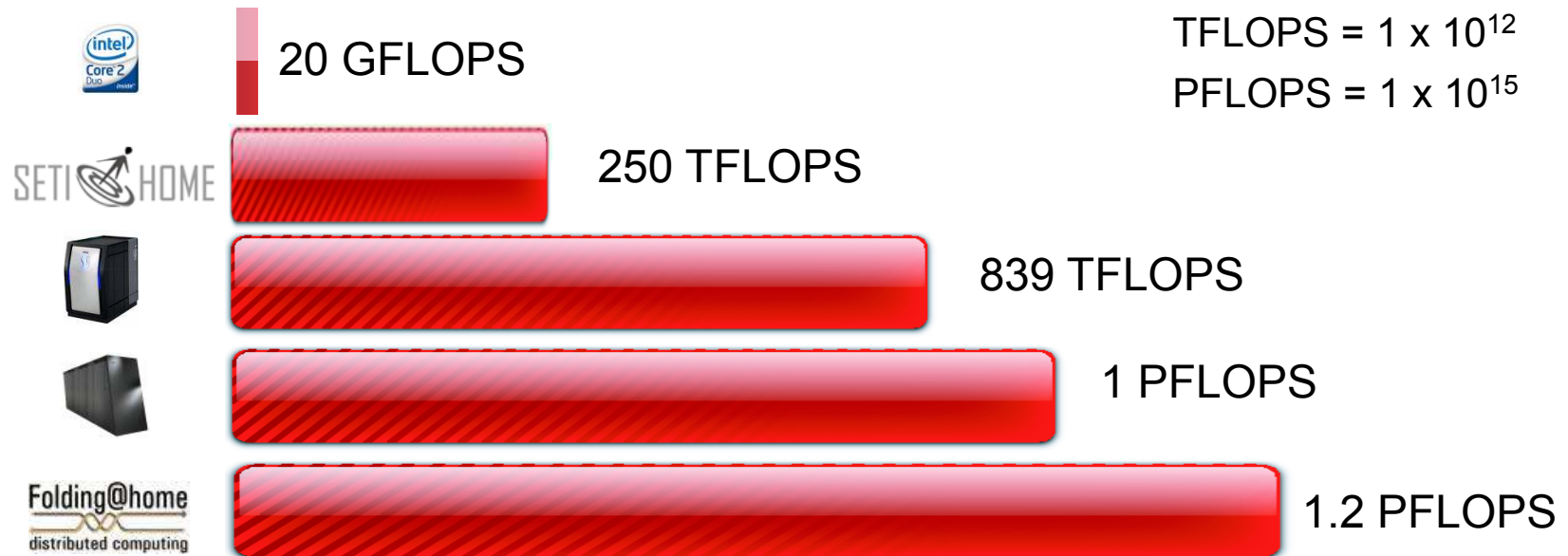
What is Grid computing?

- 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

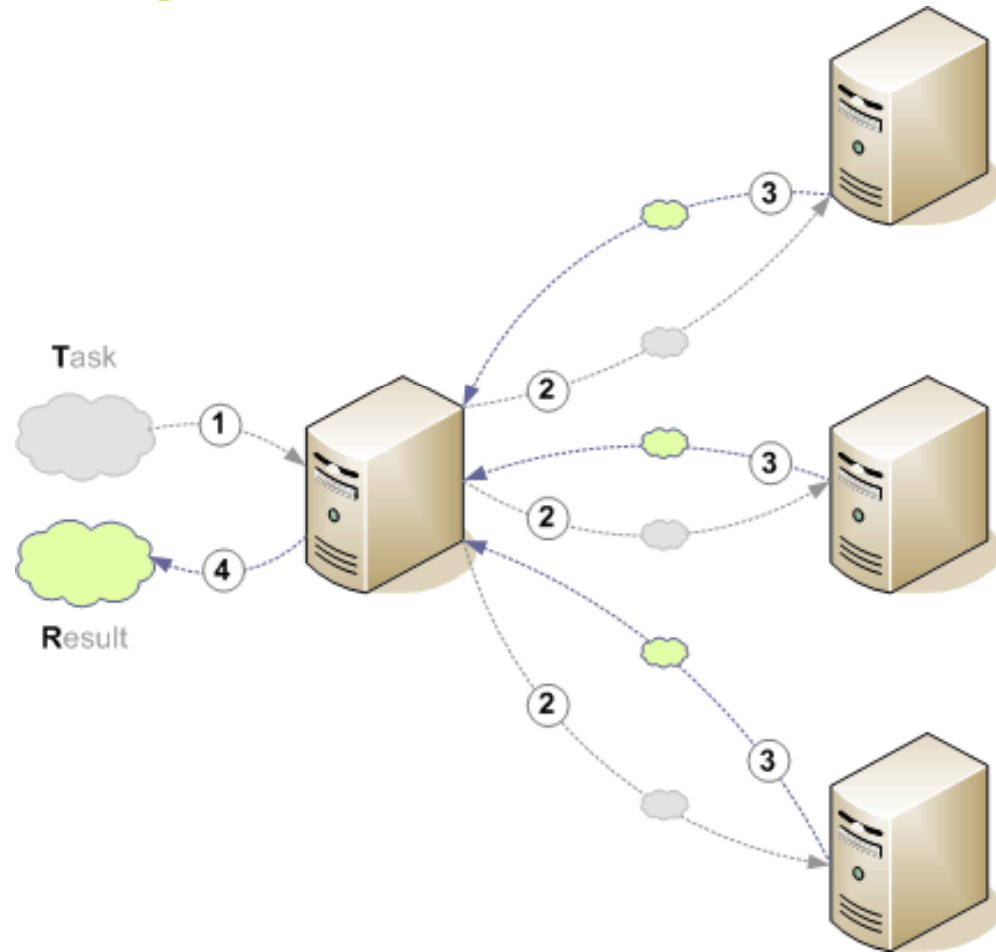
- terracotta, hadoop, gridgain etc...





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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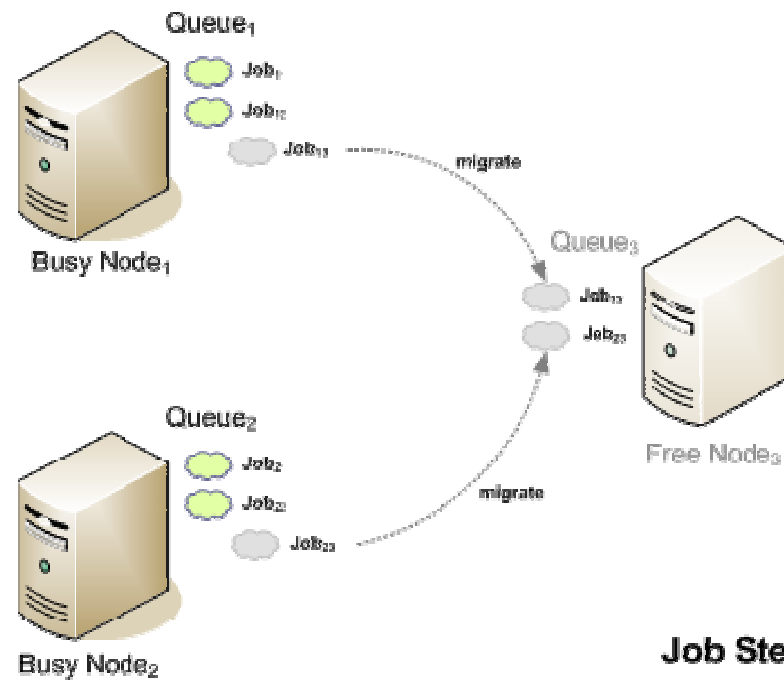
Load Balancing

- 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?
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- More information:
 - <http://www.gridgain.com>
 - <http://www.gridgainsystems.com:8080/wiki>





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Thank you!

