



# Jini<sup>TM</sup> Technology & the Grid: a Technology Exploration

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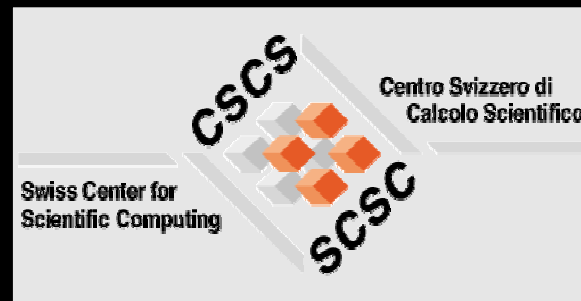
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# Overview

- Definition of Computational Grids
- Collaborative Research Overview
- Usage Scenario
  - Jini™ technologies employed
- Summary
- Q & A

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# Computational Grid

- **Resources**
  - Computation, storage, instrumentation
- **Geographically Distributed**
  - Spanning administrative domains
  - Governed by local policies
- **Integrated**
  - In a unified manner
  - Ubiquitous
  - Respecting local site policies





# Collaborative Research

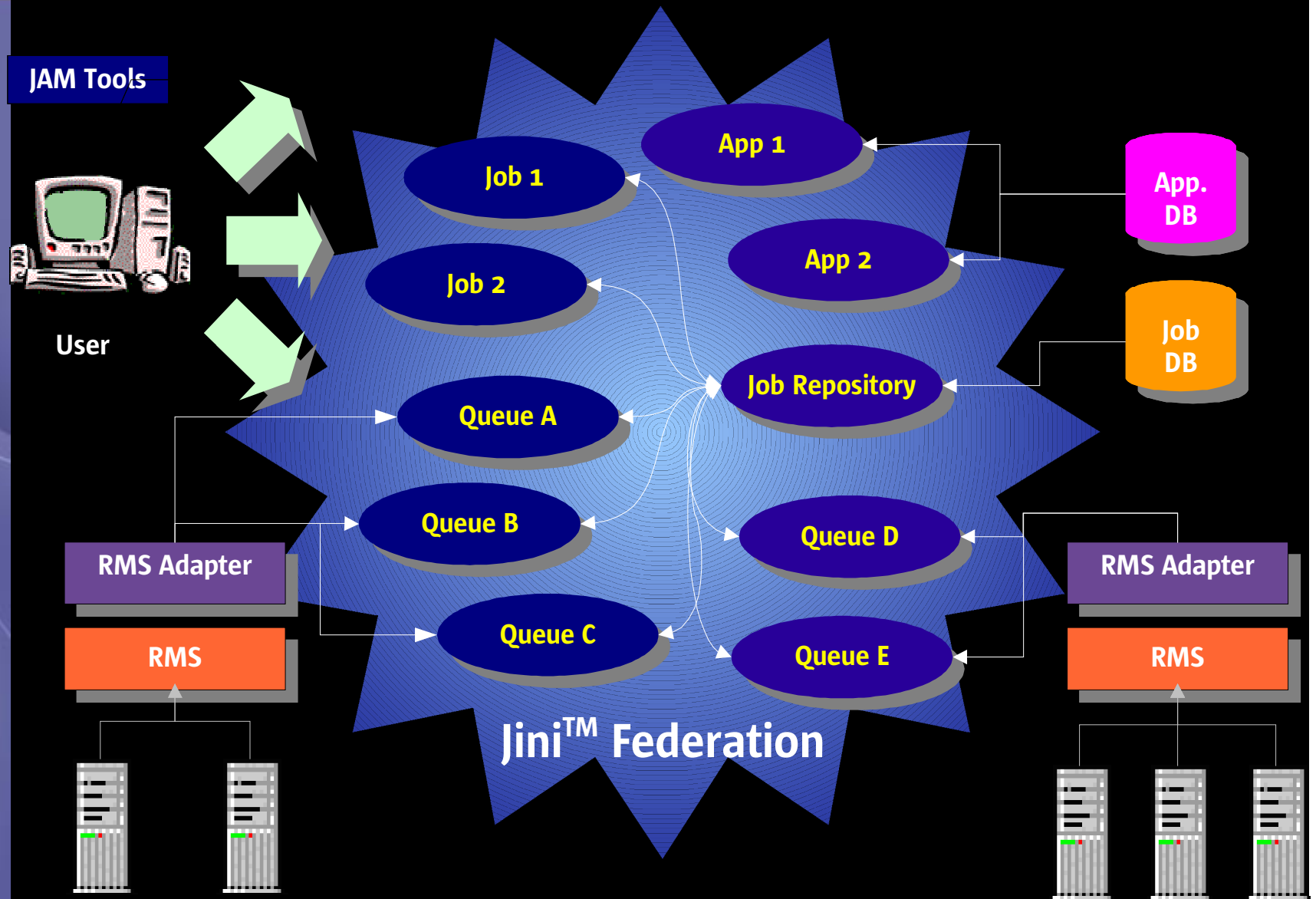
- Sun Microsystems
- Swiss Center for Scientific Computing (CSCS)
- Research! Not a current or future Sun product
  - Technology Exploration: Java<sup>TM</sup> in HPC
  - Domain: Distributed Resource Management
- Technologies employed
  - Java<sup>TM</sup>, Jini<sup>TM</sup>, JavaSpaces<sup>TM</sup>
  - Sun<sup>TM</sup> Grid Engine



# Job & Application Manager (JAM)

- **Resources**
  - Applications
    - Existing, unmodified HPC codes
  - Compute cycles
    - Local resource manager queues
- **Geographically Distributed**
  - Intranet domain
- **Integrated**
  - Application selection & execution framework

# JAM Architecture





# Jini<sup>TM</sup> Services for JAM

- JAM entities reflected as Jini<sup>TM</sup> services
  - Applications, queues
  - Currently executing jobs submitted via JAM
- Benefits of the Jini<sup>TM</sup> service model
  - Services visible on the network (ubiquity; mobility)
  - Service interfaces; proxies (unified view)
  - Leases; events (dynamic view)

# Usage Scenario

- **Two Phases**
  - User application & Queue Selection
  - Job lifecycle management
    - Launch, Monitor, Control
- **Describe and illustrate each phase**

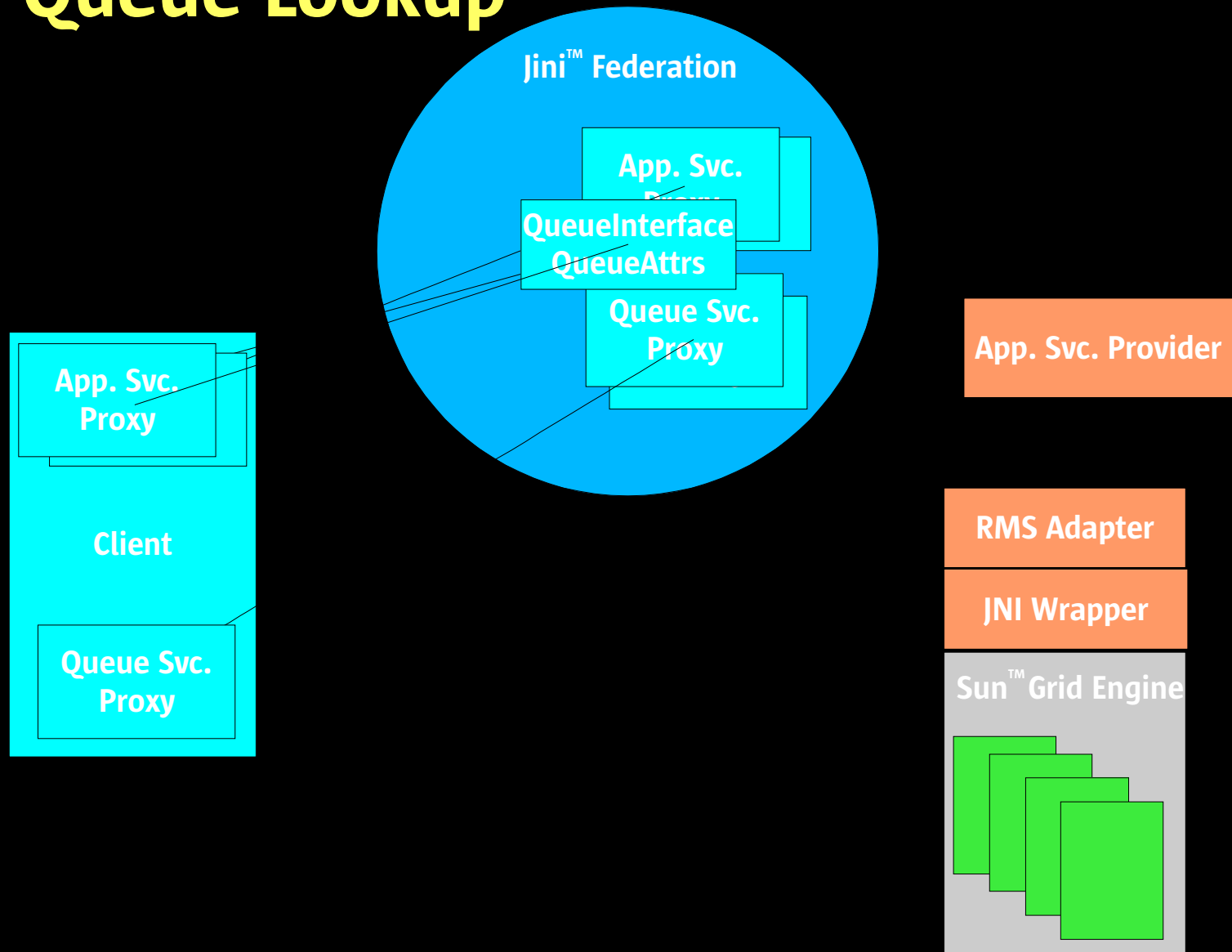


# Application & Queue Selection

- 1) Jini™ lookup of applications
  - By JAM client
- 2) User selects application
- 3) Jini™ lookup of candidate queues
  - By application proxy
    - Attribute matching
      - Application defined
      - User specified
- 4) User selects queue



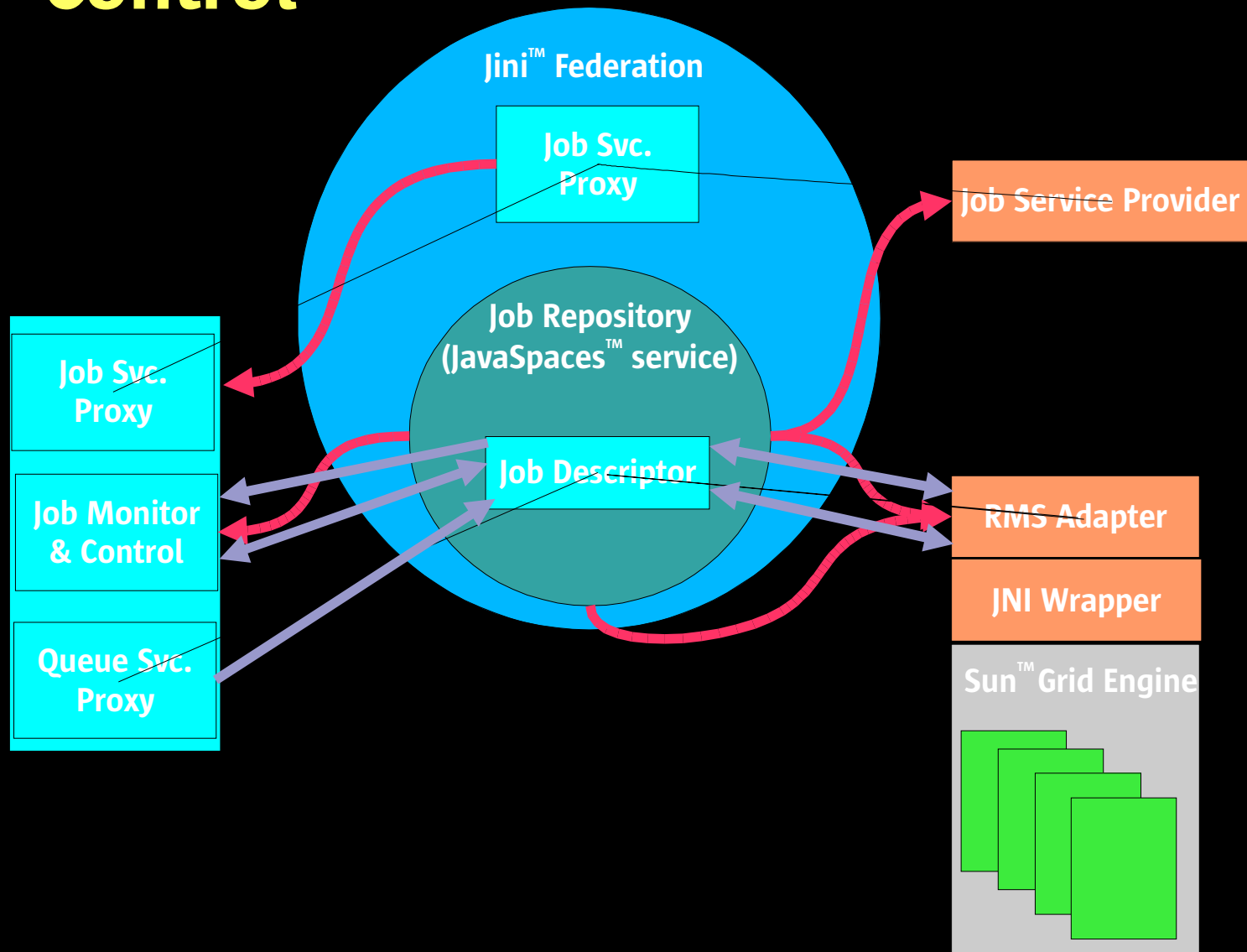
# App. & Queue Selection: Queue Lookup



# Job Launch, Monitoring & Control

- Loosely coupled distributed system
  - Interacting autonomous entities
- JavaSpaces<sup>TM</sup> Service
  - Distributed coordination/collaboration framework
  - Shared object repository
    - Storage; exchange mechanism
    - Content-based lookup
      - Polling or event-driven
- Job Descriptors

# Job Lifecycle Management: Control





# Summary

- **Grid infrastructure enablers:**
  - Java™, Jini™, JavaSpaces™ technologies
  - Sun™ Grid Engine
- **We're actively researching...**
  - Sun white paper: "Distributed Application Management using Jini™ Connection Technology"
  - Grid Forum
    - <http://www.gridforum.org>
    - Jini™ task group:  
<http://www.cs.cf.ac.uk/User/O.F.Rana/jini/>
    - BOF
      - Wednesday 5:30-7:00PM; Room D262-264