Implementing Tivoli at Princeton University

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Issues for Higher Education

- Economic justification is difficult
- Different time constraints than business
- Few colleges or universities use ESM systems
- Many locally developed tools
Bringing Tivoli to Princeton

- Princeton Partnership 2000 project
  - Convert applications to distributed platforms
  - Provide infrastructure comparable to mainframe
- Tivoli/Princeton partnership
  - Broad range of products
  - Evaluate applicability in higher education
Implementation Timeline

♦ June 1998 – Purchased Tivoli suite
♦ December 1998 – TWS (Maestro) in production
♦ Sept-Dec. 1998 – Framework/DM/TEC architecture planning and initial implementation
♦ April 1999 – Permanent ESM group formed
♦ Sept. 2000 – All production systems monitored
Tivoli Products Initially Installed

- Enterprise Console
- Distributed Monitoring
- Workload Scheduler (Maestro)
- NetView
- Service Desk
Current Tivoli Configuration

- Distributed Monitoring
  - 150 Solaris and Windows NT hosts
  - Monitor system health (CPU, Memory, Disk, etc.)
  - E-mail and pager notification from TEC & DM
  - Web page monitor

- Workload Scheduler (Maestro)
  - 25 hosts, 300 schedules, 2000 jobs
  - Monitored via DM and TEC
Current Tivoli Configuration

♦ NetView
  ♦ Used in addition to existing tools
  ♦ Processing SNMP traps
  ♦ Notifications via e-mail and pager
  ♦ Not sending Tivoli events

♦ Service Desk
  ♦ Replaced by locally developed Web application
Staffing/Organization

- Began with temporary project team
- Hired consultants for initial design and installation
- Created permanent ESM group after initial installation
- Service Desk implemented by Help Desk staff
- Netview implemented by Networking staff
Enterprise Systems Management

- Manager
- Two system administrators
- Responsibilities
  - Tivoli Monitoring
  - Tivoli Workload Scheduler
  - Dazel Output Management
Completed Projects

- Heartbeat system
- Customized event display
  - Group events by host and application area
  - Modify event contents via TEC rules
- Web event display
- Web page monitor
- Tools to instrument non-Tivoli monitors
### Tivoli event summary: Fri Mar 30 12:24:49 2001

<table>
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<tr>
<th>Subtotals</th>
<th>CRITICAL</th>
<th>MINOR</th>
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### ALERTS for ALL systems as of Wed Mar 28 15:05:51 2001

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Planned Projects

- Logfile adapters for application logs
- Notification engine for TEC
- Manager for Oracle
- Application Performance Monitor
Lessons Learned

- Underestimated time and staffing needs
- Difficulty of replacing existing tools
- Top-down vs. bottom-up strategy
Why did we underestimate time and staffing?

- Turnkey application vs. toolkit
- Difficulty of changing current practices
- Time required to master products
- Operational tasks preempt development
- Open positions
- Multiple projects
Why not replace existing tools?

♦ Existing tools are
  ♦ Not integrated
  ♦ Not uniform

♦ But, these tools are also
  ♦ Well understood
  ♦ Tested and reliable
  ♦ Integrated into operational processes
Development Strategies

Bottom-up
- Start with infrastructure
- Synthesize application status from lower level events
- Users are system administrators
- Replace existing monitors

Top-down
- Start with applications
- Analyze application problems based on lower level information.
- Users are application owners and operations
- Integrate existing monitors
Development Strategies

+ Bottom-up -

- Models application dependencies
- Drives high reliability
- Needs buy-in from system administrators
- Replaces existing tools

+ Top-down -

- Models end-user experience
- Adds value immediately
- More complex monitors
- Less sophisticated users

Planet Tivoli, May 2001
Princeton University
Summary – Tivoli@Princeton

- TWS schedules all new application systems
- NetView provides critical operation alerts
- TEC/DM monitors all production hosts
- Progress has been slower than expected
- Future TEC/DM development will focus on applications rather than infrastructure
For more information

♦ Princeton ESM Web site: http://www.princeton.edu/~esm
♦ E-mail augustin@princeton.edu