

.NET UI Load Balancing & Clustering

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QAD .NET UI Load Balancing & Clustering

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Agenda

- Introduction
 - .NET UI Architecture
 - .NET UI Load Balancing & Clustering
 - Manual Load Balancing
 - DNS Round Robin
 - Hardware Load Balancing
 - Other Solutions
 - Case Study: Load Balancing with 1000+ Users
 - Questions

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- One of the first to implement Load Balancing with .NET UI
- Performed specialized services at more than 50 QAD customer sites:
 - Progress Database Administration
 - Install/Upgrades/Migrations of Progress & QAD Applications (.NET UI, Qxtend, etc...)
 - Technical Audits / Performance Tuning
 - Business Continuity Strategies
- Key Member in a large ongoing QAD Implementation

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Before We Start...

- Your Mileage May Vary*
 - Information in this presentation may not necessarily apply to your environment
 - Focused primarily on .NET UI, not a full load balancing / clustering solution for the rest of the QAD system

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What is Load Balancing?

- Load balancing is a computer networking method for distributing workloads across multiple computing resources. Load balancing aims to optimize resource use, maximize throughput, minimize response time, and avoid overload of any one of the resources.



Reference: [http://en.wikipedia.org/wiki/load_balancing_\(computer\)](http://en.wikipedia.org/wiki/load_balancing_(computer)) Image: <http://theyoudartistics.com/2012/05/09/see-saw-of-life/>

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Why Load Balance .NET UI?

- Scalability:
 - Performance and stability issues with 250+ connections in past versions (400-600 in later/current versions) per Tomcat instance
 - Calculate your connections:
 - Number of UI Configurations X Number of users X Maximum connections (tabs) in User Option Telnet Maintenance
 - Example: (DEV 10 users X 5 Max) + (QA 20 X 5 Max) + (PROD 100 X 5 Max) = 650 Connections

Reference: QAD .NET UI Deployment Considerations Sep. 2007

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Max Connections

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Why Load Balance .NET UI?

- High Availability:
 - Downtime Avoidance
 - Protect against localized failure such as a server crash or hardware failure
 - Ability to maintain a server or node without rendering the UI unavailable
 - Seamlessly failover to working nodes/servers

Reference: QAD .NET UI Deployment Considerations Sep. 2007

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.NET UI Architecture

Reference: QAD .NET UI Installation Guide

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Tomcat Monitoring

- Tomcat Status: `http://<server>:<Tomcat Port>`
- Example: `http://serv456.com:8086`

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Tomcat Monitoring cont'd

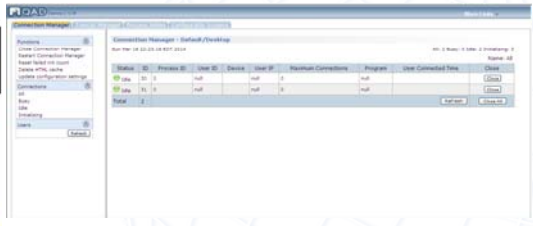
- Tomcat Status: Other Methods:
 - Check if process is running:
 - `PID=$(cat $TOMCAT/logs/tomcat.pid)`
 - `PID_STATUS=$(ps -ef | grep $PID | grep -c $TOMCAT/)`
 - Use port monitor: (OE Management, Monitoring Framework or other tool)

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Connection Manager Monitoring

- `http://<Tomcat Host>:<Port>/<UI Name>`
 - Example: `http://serv456.com:8086/PROD_294`



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Connection Manager Pool Monitoring

- **Connection Manager Heartbeat URLs:**
 - `idle.jsp`:
 - Returns number of idle sessions
 - `status.jsp`:
 - Returns total/busy/initializing/idle status:
 - All: 3
 - Busy: 1
 - Init: 0
 - Idle: 2
 - `busy.jsp`:
 - Returns number of busy sessions

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Connection Manager Pool Monitoring cont'd

- **Connection Manager Heartbeat URLs:**
 - `init.jsp`:
 - Returns number of sessions initializing
 - `list.jsp`:
 - Returns detailed info on busy sessions:

PID	USER	DEVICE	IP	MAX	PROGRAM	TIME
1181226	mrtjaak	/dev/tty20	136.18.203.4	5	java.exe	Sun Mar 16 22:26:41 EDT 2014
6764895	mrtjaak	/dev/tty77	136.18.203.4	5	java.exe	Sun Mar 16 22:26:47 EDT 2014
3520498	blamark	/dev/tty57	136.18.203.67	5	java.exe	Sun Mar 16 22:19:19 EDT 2014
296249	mlcham3	/dev/tty151	136.18.203.288	5	java.exe	Sun Mar 16 22:31:40 EDT 2014
882228	mlcham3	/dev/tty153	136.17.87.66	5	java.exe	Sun Mar 16 22:35:01 EDT 2014

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Connection Manager Pool Monitoring cont'd

- **Connection Manager Heartbeat URLs:**
 - Can be accessed via web browser: `http://<Tomcat Host>:<Port>/<UI-name>/heartbeat/idle.jsp`
 - Can also be accessed by using a command line browser such as "lynx": <http://lynx.isc.org/>
 - With "lynx", we can incorporate web commands into scripts for monitoring, starting and stopping the connection pool
 - Can be used by load balancing device

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.NET UI Load Balancing Requirements

- Load balancing method must enforce session persistence
- Static data located within the Tomcat webapps, such as process maps, must be replicated throughout all Tomcat instances
- User data, such as favorites must be available from any of the Tomcat instances
 - Located in `<Tomcat Install>/webapps/qadhome/configurations/<UI Config>/storage`
 - Can be replicated using scripting
 - Can exist in a common location and accessed using NFS mounts (mapped drives) or soft links

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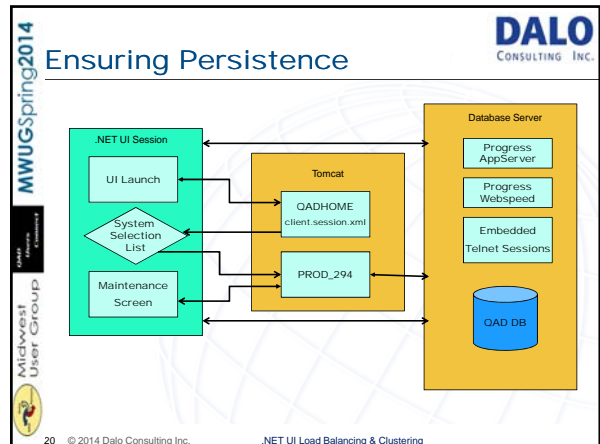
.NET UI Load Balancing Requirements

- **Tomcat <Tomcat Install>/conf/context.xml must be modified in order for soft-links to work:**

```

<Context path="/qadhome" allowLinking="true">
  <!-- Default set of monitored resources -->
  <WatchedResource>WEB-INF/web.xml</WatchedResource>
  <!-- Uncomment this to disable session persistence across Tomcat restarts -->
  <!--
  <Manager pathname="" />
  -->
  <!-- Uncomment this to enable Comet connection tacking (provides events
  on session expiration as well as webapp lifecycle) -->
  <!--
  <Valve className="org.apache.catalina.valves.CometConnectionManagerValve" />
  -->
</Context>
    
```

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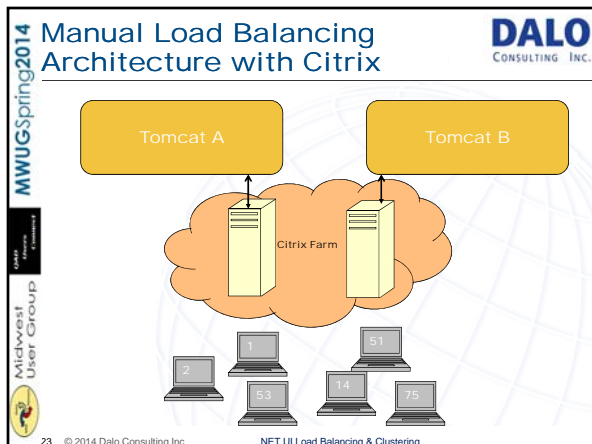
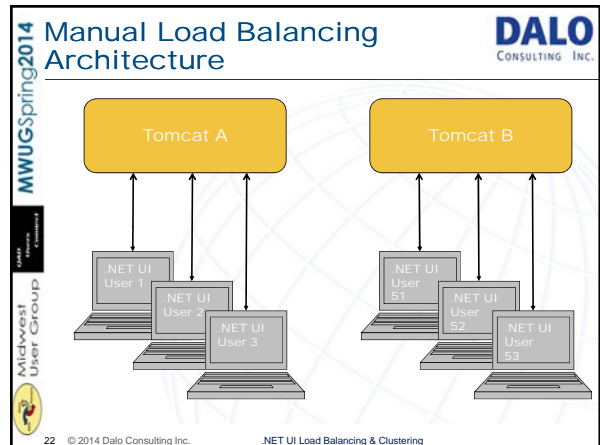


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Manual Load Balancing

- **Specifically assigned groups of users to Separate .NET UI instances**
- **Example:**
- Users 1-50 assigned to Tomcat1
- Users 51-100 assigned to Tomcat2
- **Easy to implement**
- **Must keep track of user assignment**
- **No support for high availability, unless the client front end is hosted (Citrix / Terminal Server) and also load balanced.**

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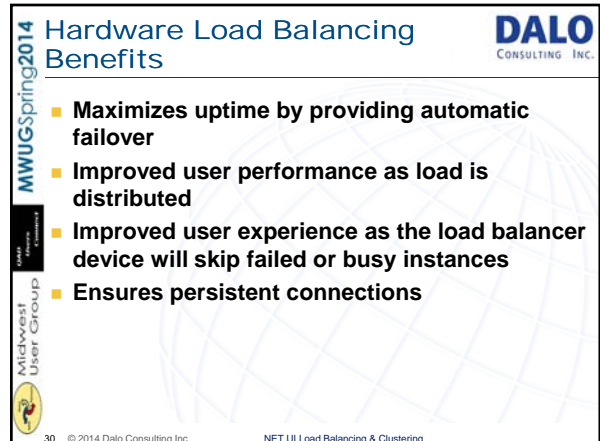
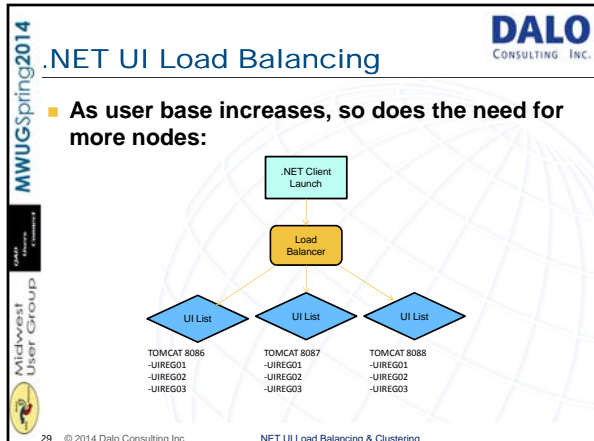
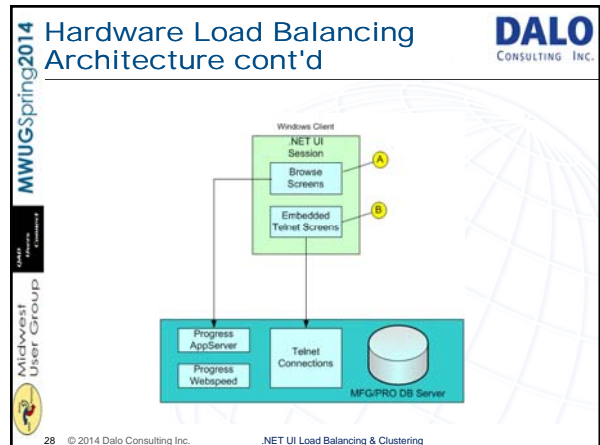
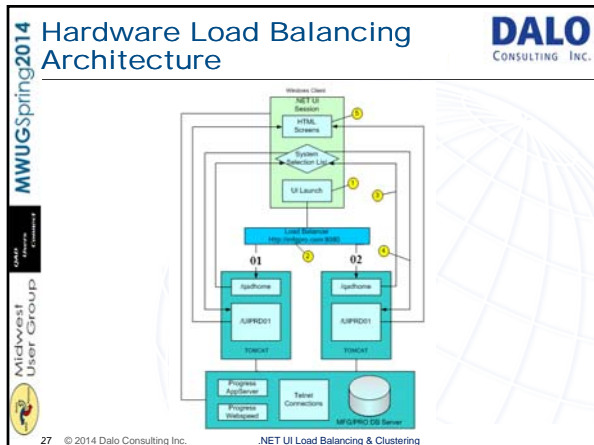
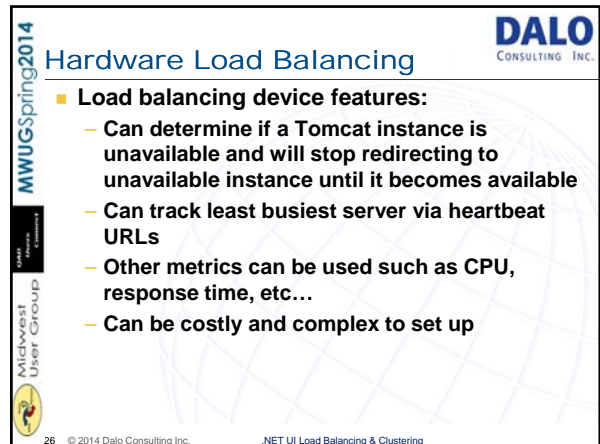
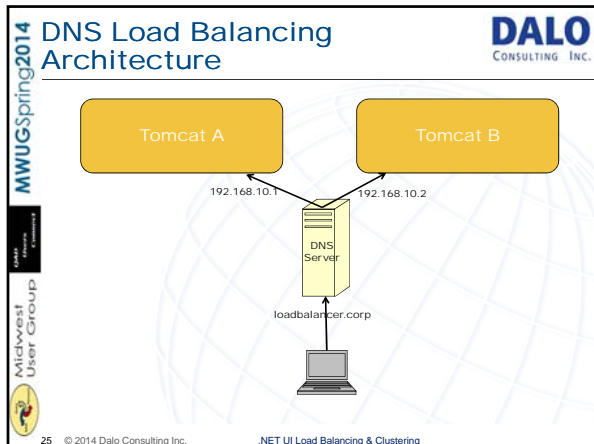
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Round-Robin DNS

- **Works by translating a common web address into multiple IP addresses**
- **Example:**
- Users are configured to connect to <http://loadbalancer.corp>, but can be redirected to any of the following servers:
- 192.168.10.1
- 192.168.10.2
- 192.168.10.3
- **Easy to implement**
- **No need to keep track of user assignment**
- **No support for high availability**

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.NET UI Configuration Guidelines for Load Balancing

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- Use actual server names when configuring additional .NET UI builds
- Files/Directories that contain hostname and Port information:
 - DELETE: /<TOMCAT>/webapps/<UI NAME>/screen.xml
 - DELETE: /<TOMCAT>/webapps/<UI NAME>/headerhtml.out
 - DELETE: /<TOMCAT>/webapps/<UI NAME>/cache/*
 - CHANGE SERVER NAME: /<TOMCAT>/webapps/<UI NAME>/WEB-INF/conf/connectionManagerConfig.xml
 - CHANGE SERVER NAME: /<TOMCAT>/webapps/<UI NAME>/WEB-INF/conf/process-config.xml
 - CHANGE SERVER NAME: /<TOMCAT>/webapps/qadhome/configurations/<UI NAME>/client-session.xml

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.NET UI Configuration Guidelines for Load Balancing

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- Configuration Guidelines for this Load Balancing Architecture (con't):
 - Make sure that each client config file in the qadhome directory points to its respective instance
 - Use the load balancer URL to install or re-install .NET UI clients
 - Example:
 - Instead of `http://mydot net:8080/qadhome`
 - Use
 - `http://loadbalancer:8080/qadhome`

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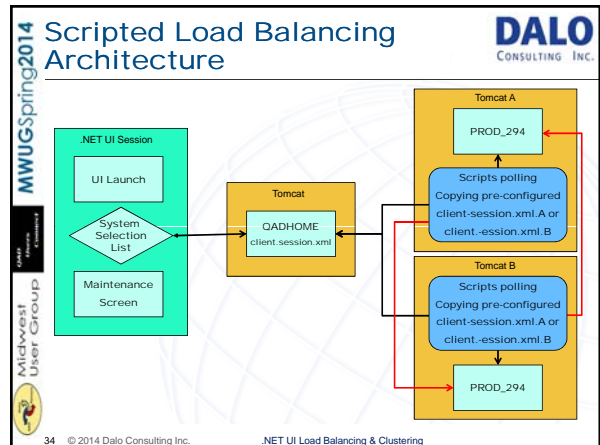
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Scripted Load Balancing

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- Scripts can be set up to monitor the least busiest instances and automatically modify the client-session.xml files accordingly
- Uses only one qadhome server
- Aside from the qadhome, can provide failover capabilities among Tomcat instances and servers
- Can be combined with other load balancing schemes
- No known sites using this in production

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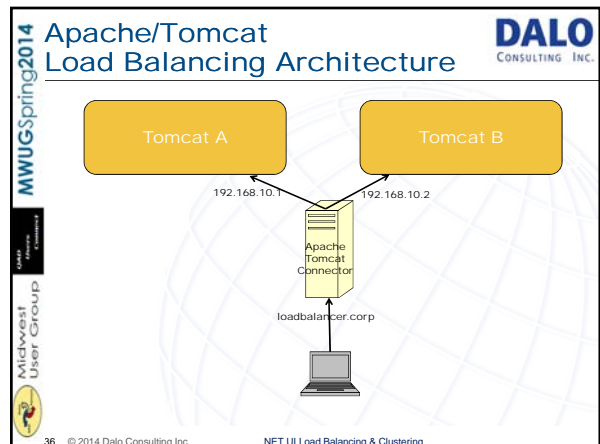
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Apache/Tomcat Load Balancing

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- Apache or Tomcat can be used to enable load balancing between multiple Tomcat instances
- Useful for distributing load and provides failover capability among Tomcat instances
- Introduces a single point of failure via the single load balancing address / webapp.
- Have not tested this
- Details here: http://tomcat.apache.org/connectors-doc/generic_howto/loadbalancers.html

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Case Study: Large Auto Parts Manufacturer

- Large QAD UI User base: 1000+ Users worldwide
- Limited number of connections per Tomcat was 250 at the time of implementation
- High availability and redundancy required
- Solution: Hardware load balancing**

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Case Study: Large Auto Parts Manufacturer

- Hardware: Redundant Cisco CSS 11500 Series
- LB calls URI which is a perl script that calculates total sessions busy per Tomcat instance
- Clients: Citrix & Windows 7
- User data shared using softlinks and an NFS mount

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Hardware Load Balancing Architecture

The diagram illustrates the hardware load balancing architecture. On the left, a cloud labeled 'NET UI Citrix Farm' contains three server icons. Below it, three laptop icons represent clients. A central Cisco CSS 11500 Series load balancer is shown with arrows pointing to two server racks. Server 1 and Server 2 each contain three Tomcat instances (8080, 8081, 8082). Each Tomcat instance has a specific URI: QADHOME, NA_291, EU_291, and AP_291. The load balancer is labeled 'netui:8080'.

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Questions?

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Questions

- Questions or comments? Feel free to e-mail me:

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