Jump Starting Solution Deployments for Linux on z/Series

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Agenda

- Patterns for e-Business
- Things to consider when designing a J2EE application to deploy on z/Series
- Some generic resource requirements
- System topologies
- Configuration tips
IBM Patterns for e-business

• Business Patterns identify the interaction between users, businesses, and data. Business Patterns are used to create simple, end-to-end e-business applications.
  • Business Patterns: Self Service, Collaboration, Information Aggregation, Extended Enterprise

• Self Service (User to Business) Pattern: Provides for direct interaction between interested parties (users) and a business. Interested parties include customers, Business Partners, stakeholders, employees, and all other individuals with whom the business intends to interact.
Application Topology for Self-Service Business Pattern

Directly Integrated Self-Service Pattern: Topology 2
# Things to think about...

<table>
<thead>
<tr>
<th>Solution Scope</th>
<th>Solution can be installed on a new z/Series or other existing system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solution Environment</td>
<td>Solution workloads should be able to coexist on the same machine with existing legacy workloads and new Linux workloads for server consolidation</td>
</tr>
<tr>
<td>Scalability</td>
<td>Solution should be able to scale for e-business workload to utilize zSeries resources, such as number of IFL engines, and Solution in a basic topology should be able to scale horizontally by adding more virtual servers into a topology that supports Workload Management and High Availability.</td>
</tr>
<tr>
<td>Performance</td>
<td>Solution should utilize new zSeries technologies that provide high-performance networking among LPARs and virtual machines</td>
</tr>
<tr>
<td>Usability</td>
<td>Solution should help minimize deployment time, and provide help in sizing the environment</td>
</tr>
<tr>
<td>Integration</td>
<td>Solution should help to integrate the new J2EE application with any existing z/OS applications</td>
</tr>
</tbody>
</table>
MORE things to think about...

**Topologies**
- Internet and Intranet

**Optional software**
- DB2 Universal Database™
- DB2 and WebSphere MQ connectors to existing z/OS applications
- WebSphere MQ Server to communicate with MQ clients
- Tivoli Directory Server (LDAP)

**Application server**
- WebSphere Application Server or
- WebSphere Portal or
- both

**Deployment platform**
- New LPAR on zSeries
- 1 to 3 IFLs,
- 2 GB memory per IFL recommended

**High security level**
- Optional use of Tivoli Access Manager for e-Business

**Inter-application communication**
- High performance communication to existing applications or DBs in other LPAR or other zSeries
## Memory and DASD Requirements

<table>
<thead>
<tr>
<th>Functional Node</th>
<th>SW Product</th>
<th>Required Memory (MB)</th>
<th>Recom. Memory (MB)</th>
<th>Recom. Memory (MB) - high load</th>
</tr>
</thead>
<tbody>
<tr>
<td>WebServer Redirector</td>
<td>IBM HTTP Server</td>
<td>128</td>
<td>512</td>
<td>1024</td>
</tr>
<tr>
<td>Application Server</td>
<td>WAS 5.1</td>
<td>1024</td>
<td>1536</td>
<td>2048</td>
</tr>
<tr>
<td>LDAP</td>
<td>IBM Directory Server 5.1</td>
<td>256</td>
<td>512</td>
<td>512</td>
</tr>
<tr>
<td><strong>Total w/o DB2</strong></td>
<td></td>
<td><strong>1408</strong></td>
<td><strong>2560</strong></td>
<td><strong>3584</strong></td>
</tr>
<tr>
<td>Database Server</td>
<td>IBM UDB Enterprise Server 8.1</td>
<td>256</td>
<td>512</td>
<td>1024</td>
</tr>
<tr>
<td><strong>Total with DB2</strong></td>
<td></td>
<td><strong>1664</strong></td>
<td><strong>3072</strong></td>
<td><strong>4608</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Server Node</th>
<th>Installed Software (MB)</th>
<th>Temporary Files (GB)</th>
<th>User Application Data (GB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTTP</td>
<td>50</td>
<td>1 - 6</td>
<td>1 - 7</td>
</tr>
<tr>
<td>WAS</td>
<td>350</td>
<td>1 - 6</td>
<td>1 - 7</td>
</tr>
<tr>
<td>LDAP</td>
<td>250</td>
<td>1 - 6</td>
<td>1 - 7</td>
</tr>
<tr>
<td>DB2</td>
<td>250</td>
<td>1 - 6</td>
<td>10 - 200</td>
</tr>
</tbody>
</table>
Intranet Topology on z/9xx

Note: Connections between servers in the different LPARs, marked as will be implemented as HiperSockets
Intranet Topology with TAMe on z/9xx

- Intranet DMZ
  - IBM HTTP server w. WAS Plug-in
  - WebSeal 5.1
  - IBM HTTP server w. WAS Plug-in

- Internal Network
  - z/VM
  - WAS 5.1, DB2 Connect 8.1, MQ client 5.3
  - IDS 5.2 (LDAP)
  - TAM Policy Server 5.1
  - MQ server 5.3
  - DB2 UDB 8.1
  - WS Portal 5.0.2, incl. WAS EE 5.0.2
    - DB2 Connect 8.1
    - MQ client 5.3

- Domain Firewall

- Legacy applications

- z/VM

- z/OS

- LPAR1 - Linux Workloads

- IFLs

- z900 Hardware

- LPAR2 - Legacy

- CPs

Note: Connections between servers in the different LPARs, marked as will be implemented as HiperSockets
Internet Topology with TAMe on IBM eServer z/9xx

Note: Connections between servers in the different LPARs, marked as will be implemented as HiperSockets.
Network Implementation of the Internet Topology on z/9xx
VLAN-based Network Implementation of the Internet Topology on z/9xx
LPAR Configuration

- Define 2 LPARs:
  - Development/Test
  - Production
- Share all IFLs / CPs between all LPARs
- Define Expanded Storage
  - VM pages better with it
  - Aim for a 75/25 ratio
- Use HiperSockets to get access to data on z/OS if you can
VM Configuration

• Overcommit memory at a 1.5 : 1 ratio when running WebSphere in Linux guests
  • Every 1000M virtual backed by 666M real

• Use VSWITCH for guest communication if you have z/VM 4.4
  • VSWITCH CONTROLLER ON
  • DEFINE VSWITCH 9DOTLAN RDEV 83C PORT PETLNX1B
  • MODIFY VSWITCH 9DOTLAN GRANT OSATEST1
  • NICDEF 0500 TYPE QDIO LAN SYSTEM 9DOTLAN

• Use VDISK for Linux swap devices
  • 15% of guest size is a good starting place for known stable workloads
  • 250% of guest size for new workloads, then monitor and reduce as possible

• NO minidisk cache if Linux is running on minidisks!

• Change the default SRM settings
  • STORBUFF = 300, 200, 200
  • LDUBUFF = 100, 100, 100
Linux Configuration

• CPUs:
  • Define guests with same numbers of CPs as available to VM
  • Or 4, if VM has more than that (2.6 kernel may change this rule)

• Memory:
  • Give Linux the bare minimum it needs to run WAS and the Application
  • Do not over allocate memory for Linux – it will just waste it
  • Linux should swap some as the application is starting to support users, then stabilize

• How Many guests?
  • 2 GB Linuxen filled with WAS apps run just fine
  • Don't run one app per Linux instance unless the isolation is absolutely necessary
WAS Configuration

Development

- App A
  - App Server
  - Linux D1

- App B
  - App Server
  - Linux D2

Test

- App A
  - App Server 1
  - Linux T1

- App B
  - App Server 2

- App C
  - App Server 3

Production

- App A
  - App Server 1
  - Linux T1

- App B
  - App Server 2

- App C
  - App Server 3

- App D
  - App Server 1

- App E
  - App Server 2

- App F
  - App Server 3

- App G
  - App Server 1

- App H
  - App Server 2

Application Isolation

Memory/CPU Efficiency
More WAS configuration

- Adjust size of JVM Heap
  - Monitor app's Heap usage while still in development and test – Use Tivoli Performance Viewer and a Verbose GC trace
  - Adjust Heap so it averages 30% free
- Adjust thread pool sizes
- Adjust Dynamic Cache settings
- Adjust EJB Cache settings
- Adjust Servlet Cache settings

Q: Adjust them how?
A: 'till it's fast enough.
DB2 Configuration

• DB2 Connect on WAS system talking to DB2 on z/OS:
  • This is where you want to use a HiperSocket
  • `db2 catalog tcpip node <shortname> remote <hostname> server <portnum>`
  • `db2 catalog database <dbname> as <dbnic> at node <shortname> authentication dcs`
  • `db2 catalog dcs database <dbname> as <ddf location>`

• DB2 running on Linux on z:
  • Place the database instance on a striped LVM group, using PAV if you have it
  • Or a software RAID 0 array, using PAV if you have it
  • Multipath SCSI is even better

• The Heavy Lifting should be done with DB2 on z/OS
HTTPs configuration

• In http.conf:
  • do not set MaxClients too large, it limits the number of incoming connections into WAS – this is a good thing
  • may want to increase MaxRequestsPerChild for better throughput
  • may want to decrease KeepAliveTimeout so that less time is spent waiting on idle clients
Application Configuration

- The application itself has the largest impact on performance
- Good Performance is designed into an application
  - It is painful to add on later
## Related Web Pages

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<tr>
<td>IBM Patterns for e-business</td>
<td><a href="ibm.com/developerworks/patterns/">ibm.com/developerworks/patterns/</a></td>
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<tr>
<td>IBM Redpaper - 'z/VM Configuration for WebSphere Deployments'</td>
<td><a href="ibm.com/redbooks/abstracts/redp3661.html">ibm.com/redbooks/abstracts/redp3661.html</a></td>
</tr>
</tbody>
</table>
Summary

• Careful planning leads to a system that will grow as needed
• Consider your security and networking needs
• Take advantage of the features of the platform
• You still need Expanded Storage
• Do not over allocate the Linux systems
• Run DB2 on z/OS for high transaction rate applications
• Do not flood the WAS queues
• Work with the application developers to reach performance goals