Lotus Domino on Linux for System z

More than just mail

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About me

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Maik Weber

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Linux – Desktop and Server

Lotus on Linux:

- **Notes/Domino**
- **Expeditor**
- **Quickr**
- **Connections**
- **WebSphere Portal**
- **...**

IBM Germany Development Laboratory

IBM Linux Integration Center

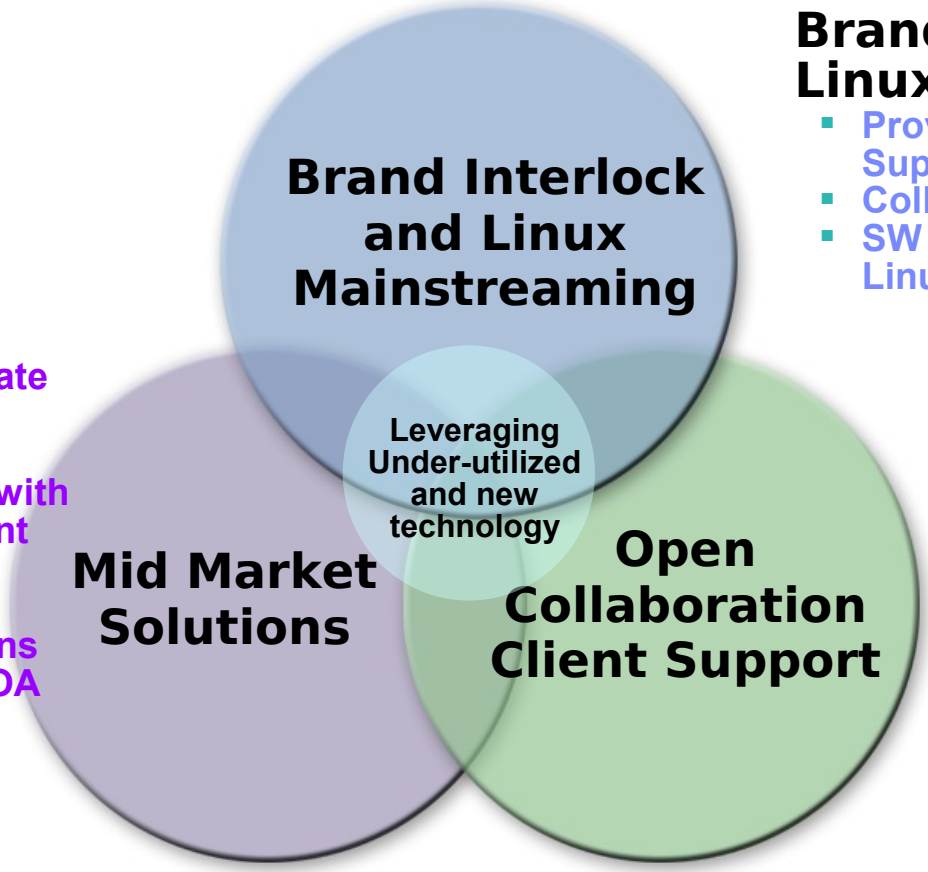
Support the IBM Open Source and Linux sales team in delivering Linux-based IBM Middleware solutions. Drive the adoption of IBM middleware solutions in the Linux mid market space, with a special focus on the IBM Open Client Solution on Linux and ensure the continued success of Enterprise middleware on Linux.

Brand Interlock and Linux Mainstreaming

- Provide traditional Pre-sales Support
- Collateral creation and delivery
- SW Certification Matrix and Linux Support Roadmap

Mid Market Solutions

- Partner with ISV/VADs to create tightly bundled solutions
- Assist partners with initial deployment and marketing
- Work with the Industry Solutions Team on new SOA solutions



Open Collaboration Client Support

- Pre-sales support for the project office
- Partner with distro on bundled solutions
- Collateral creation and delivery
- Support for CIO internal deployment

Agenda

- **Introduction to Lotus Domino**
- **Lotus Domino on System z**
- **Best Practices for Deployment on Linux for System z**

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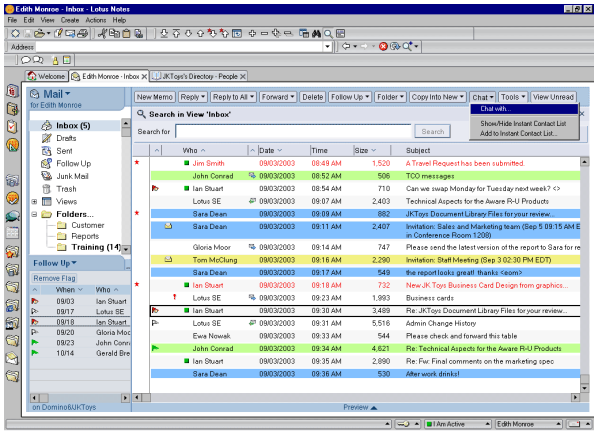
- **Lotus Domino on System z**
- **Best Practices for Deployment on Linux for System z**

History of Lotus Notes

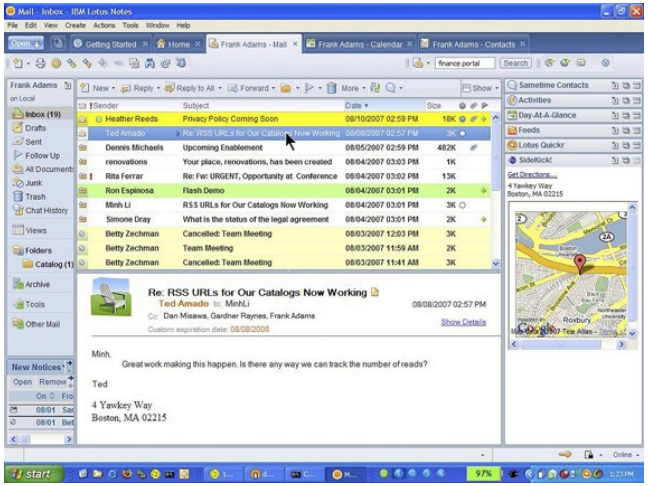
- **1984: Development started by Iris Associates**
  - Ray Ozzie, Lan Kawell, Tim Halvorsen
- **1989: Notes V1**
- **1994: Lotus purchases Iris Associates**
- **January, 1996: Notes 4**
  - A “Programmers” release introducing LotusScript and a lot of new APIs
- **July, 1996: IBM purchases Lotus**
- **December, 1996: Notes/Domino 4.5**
  - Notes Server renamed to Domino
- **1999, Notes/Domino 5**
  - Domino Designer, Domino Administrator
  - Introduction of Java, JavaScript, CORBA/IIOP, native SMTP
  - Available for Windows NT, Windows 95/98, OS/2, Netware and Unix

History of Lotus Notes

- **October, 2002: Notes/Domino 6**
  - Focus on Mobility (iNotes Web Access, Domino Everyplace Server, EasySync)
- **September, 2003: Notes/Domino 6.5**
  - "Client"-Release: Sametime instant messaging, Follow up flag, Lotus Domino Web Access
  - Expanded number of supported platforms for Domino: Linux on zSeries (S/390), Windows Server 2003
- **August, 2005: Notes/Domino 7**
  - "Server"-Release:
    - Massive scalability and performance enhancements (400% on Linux platform)
    - Domino Domain Monitoring / Activity Trends
    - Domino WebServices
    - Technical Preview of using DB2 as native datastore



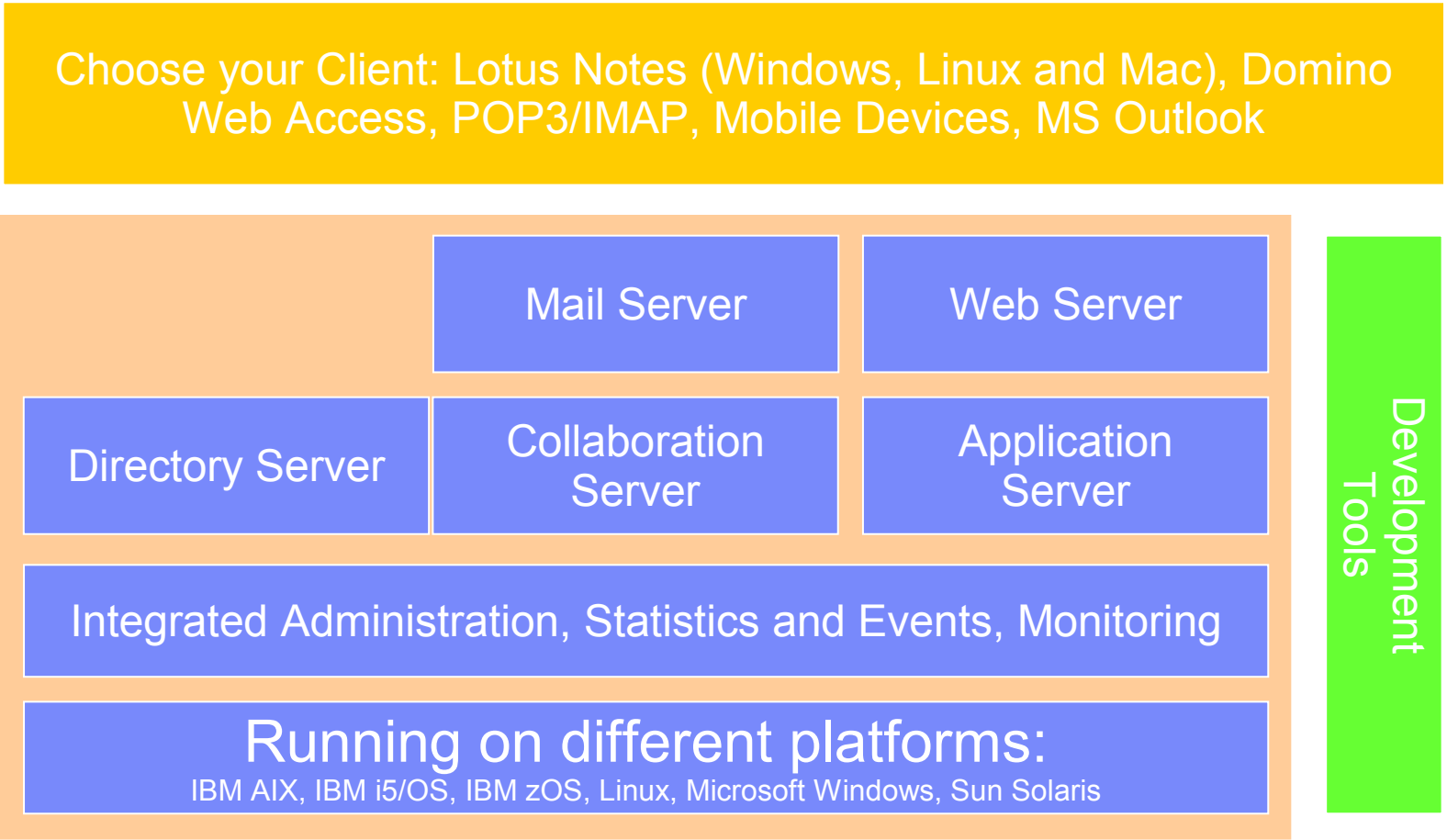
History of Lotus Notes



- **August, 2007: Notes/Domino 8**
  - "Client"-Release: "Hannover" announced in 2005
  - In-detail changes in Domino
- **Today ...**
  - 140 million seats have been sold worldwide
  - Used by more than 46,000 companies around the world
  - Lotus Notes and Lotus Domino are supported by over 10,000 IBM Business Partners worldwide, who have thousands of integrated solutions running on it
- **... and Tomorrow* – Lotus Domino 8.5**
  - "Server"-Release: Simplify UserID Management, Reduce Storage costs (Domino Attachment & Object Store), Directory independence, Domino Configuration Tuner
  - Eclipse based Lotus Notes client for Mac OS and Ubuntu 8.04, Domino Designer in Eclipse

* or better: end of 2008

Lotus Domino – More than just mail



Lotus Domino – Product Offerings

Lotus Domino Messaging Server

- **Server for business e-mail, calendar, scheduling, discussion databases**

Lotus Domino Utility Server

- **Option for deploying non-mail collaborative applications inside and outside your company**

Lotus Domino Enterprise Server

- **Messaging server plus highly available platform to run custom or vendor applications Domino Enterprise**

Lotus Domino – Express Offerings

- **Licensed on a per user basis**
- **Restrictions in functionality**
  - Partitioning and Clustering
  - Maximimum number of users: 1000
- **Available Offerings:**
  - Lotus Domino Messaging Express
  - Lotus Domino Utility Express
  - Lotus Domino Collaboration Express
- **Licencees for Express offerings are not entitled to run on System z (Linux for System z or z/OS).**

Notes Application Development

- **Develop applications (Notes Forms, Views, Agents, Applets, Servlets, Tasks) using LotusScript, Formula Language, C and Java**
- **Exchange data using Domino XML**
- **Lotus Domino ready for Service Oriented Architecture**
  - Support for Composite Applications and Web Services
- **Some Examples:**
  - Website hosted by Lotus Domino
  - Weblog
  - Teamroom
  - Document Management System

http://www.openntf.org

Lotus Domino – Supported Platforms

- **x86 32bit**
  - Microsoft Windows 2003 Server Standard/Enterprise Edition
  - Novell SUSE Linux Enterprise Server (SLES) 10
  - RedHat Enterprise Linux (RHEL) 5
- **x86 64bit**
  - Microsoft Windows 2003 Server x64 Edition
  - Novell SUSE Linux Enterprise Server (SLES) 10
  - RedHat Enterprise Linux (RHEL) 5
- **SPARC**
  - Sun Solaris 10
- **System p**
  - IBM AIX 5.3 and 6.1
- **System i**
  - i5/OS V5R4 and V6R1
- **System z**
  - z/OS Version 1, Release 7 or later
  - z/OSe Version 1, Release 7 or later
  - Novell SUSE Linux Enterprise Server (SLES) 10 on System z (64bit)
  - Red Hat Enterprise Linux (RHEL) 5 on System z (64-bit)

Detailed system requirements

Release Notes: http://publib-b.boulder.ibm.com/lotus/c2359762.nsf

Support Doc: http://www-01.ibm.com/support/docview.wss?uid=swg27012642

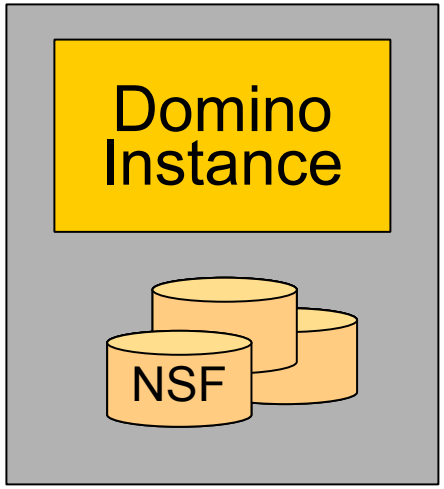
Lotus Domino 8.0.2 and 64-bit

- **Domino 8.0.2 as a 64bit is application available for these platforms:**
  - x86 64bit: Microsoft Windows 2003 Server x64 Edition
  - System i: i5/OS V5R4 and V6R1
  - System p: IBM AIX 5.3 and 6.1
- **All other 64bit platforms supporting Domino as 32bit (31bit on System z) application in compatibility mode**
  - Access up to 4GB of memory (2GB on System z) per Domino Partition (DPAR)
  - Multiple instances of Domino (Partitions) utilizing large memory configurations

Deployment

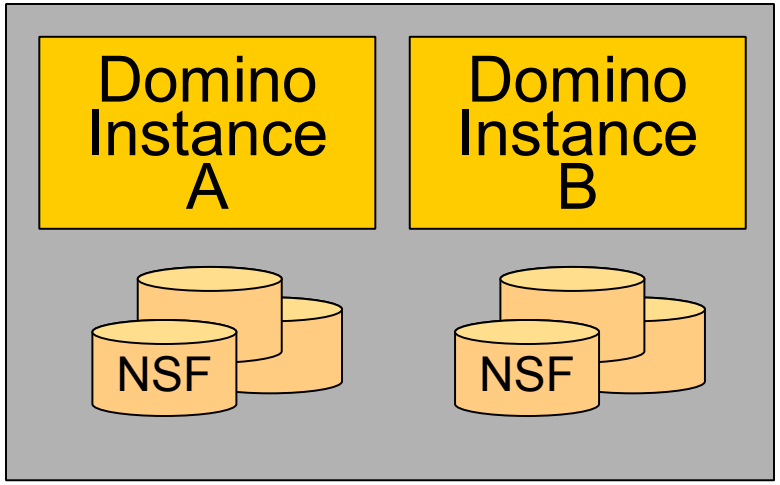
Single Server

- Single Domino instance on one machine



Partitioned Server

- Several Domino instances on one machine
- Supported by Domino Messaging Server, Utility Server and Enterprise Server
- Better hardware utilization
- Provides Scalability

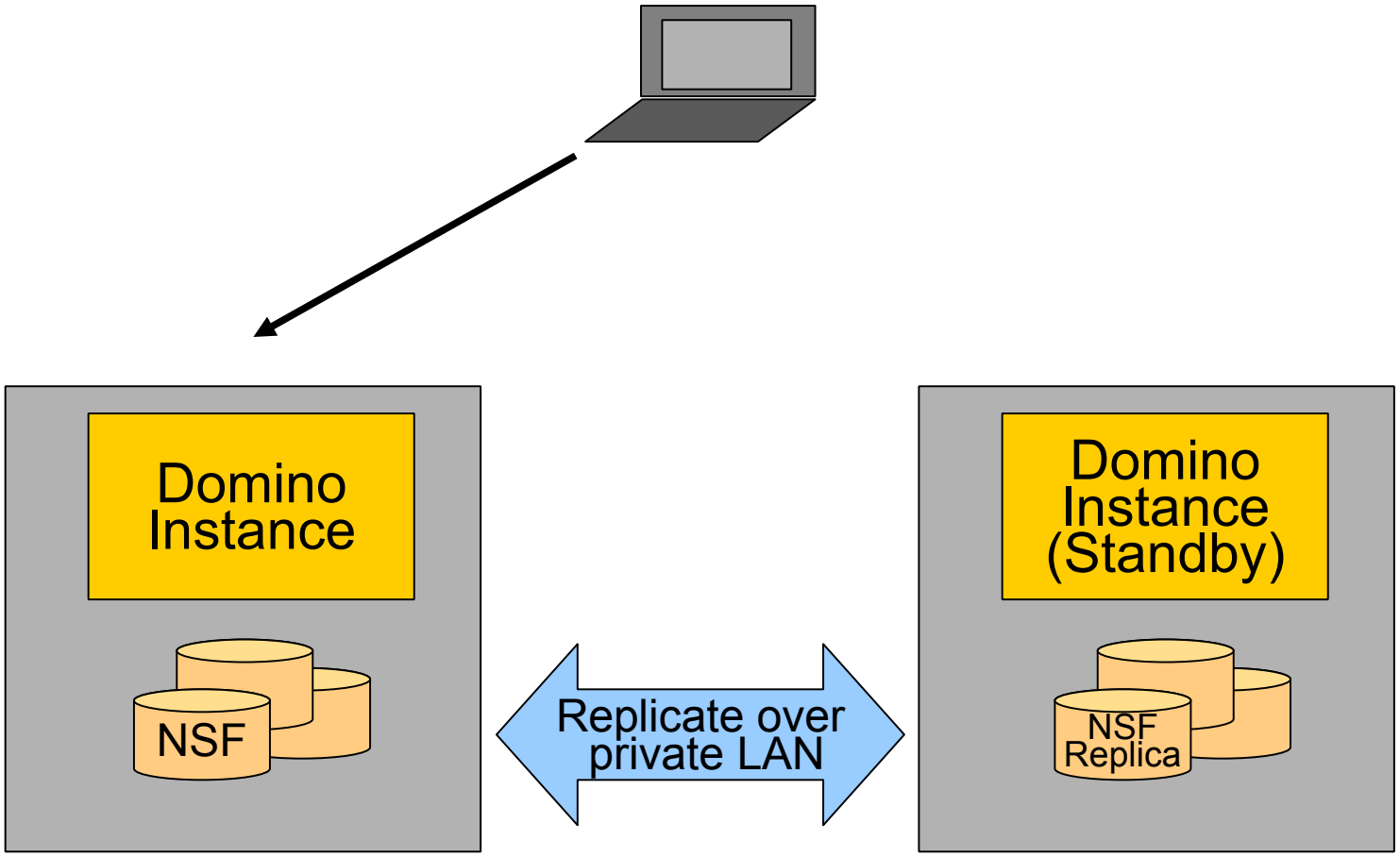


High Availability of Lotus Domino

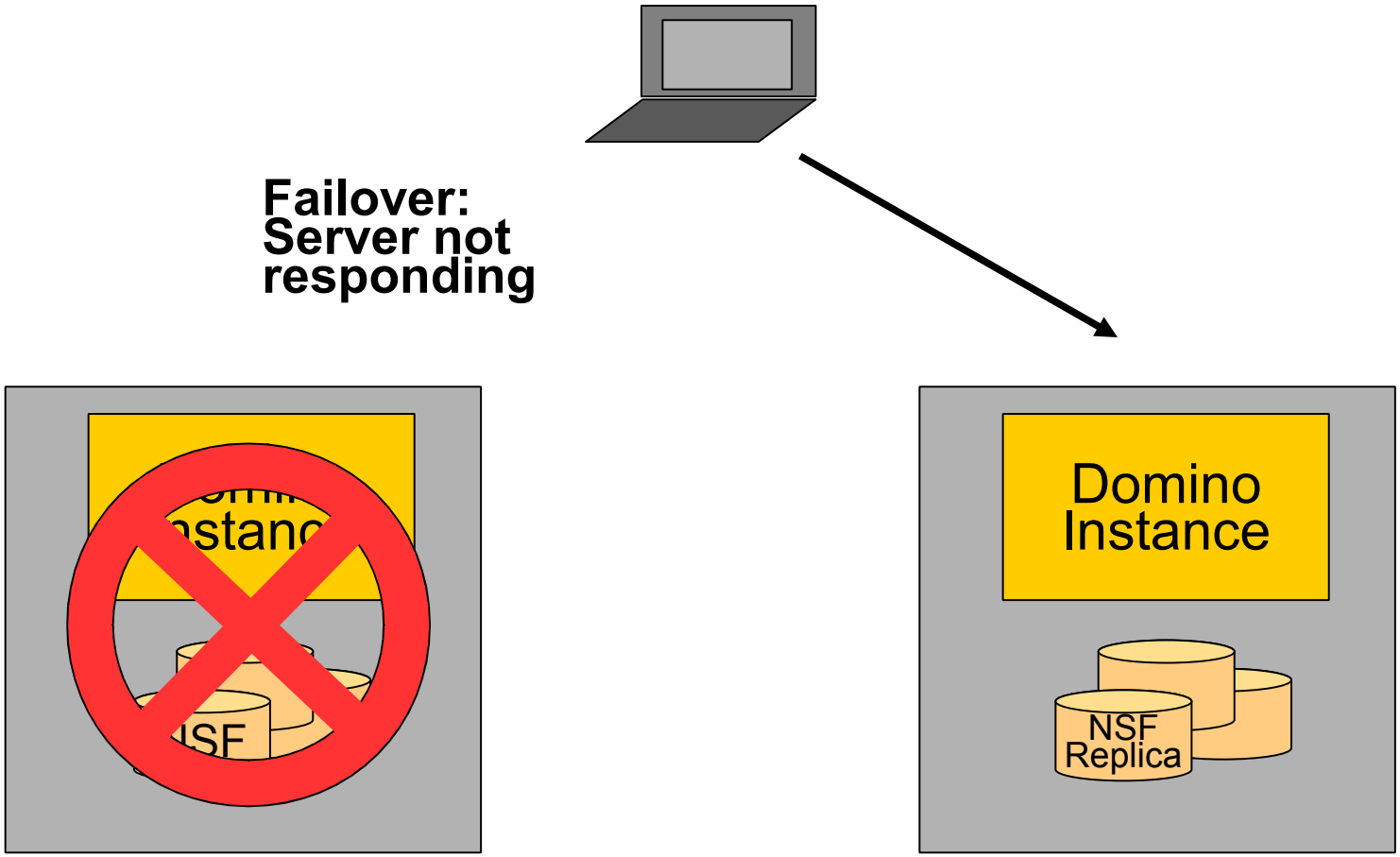
Domino Clustering

- High Availability of critical databases (mail and applications)
- Fail over and Workload Balancing
  - Active/Hot-Standby
  - Active/Active
- Supported by Domino Utility Server and Enterprise Server
- Use of any supported hardware and operating system
- Can be combined with operating system cluster

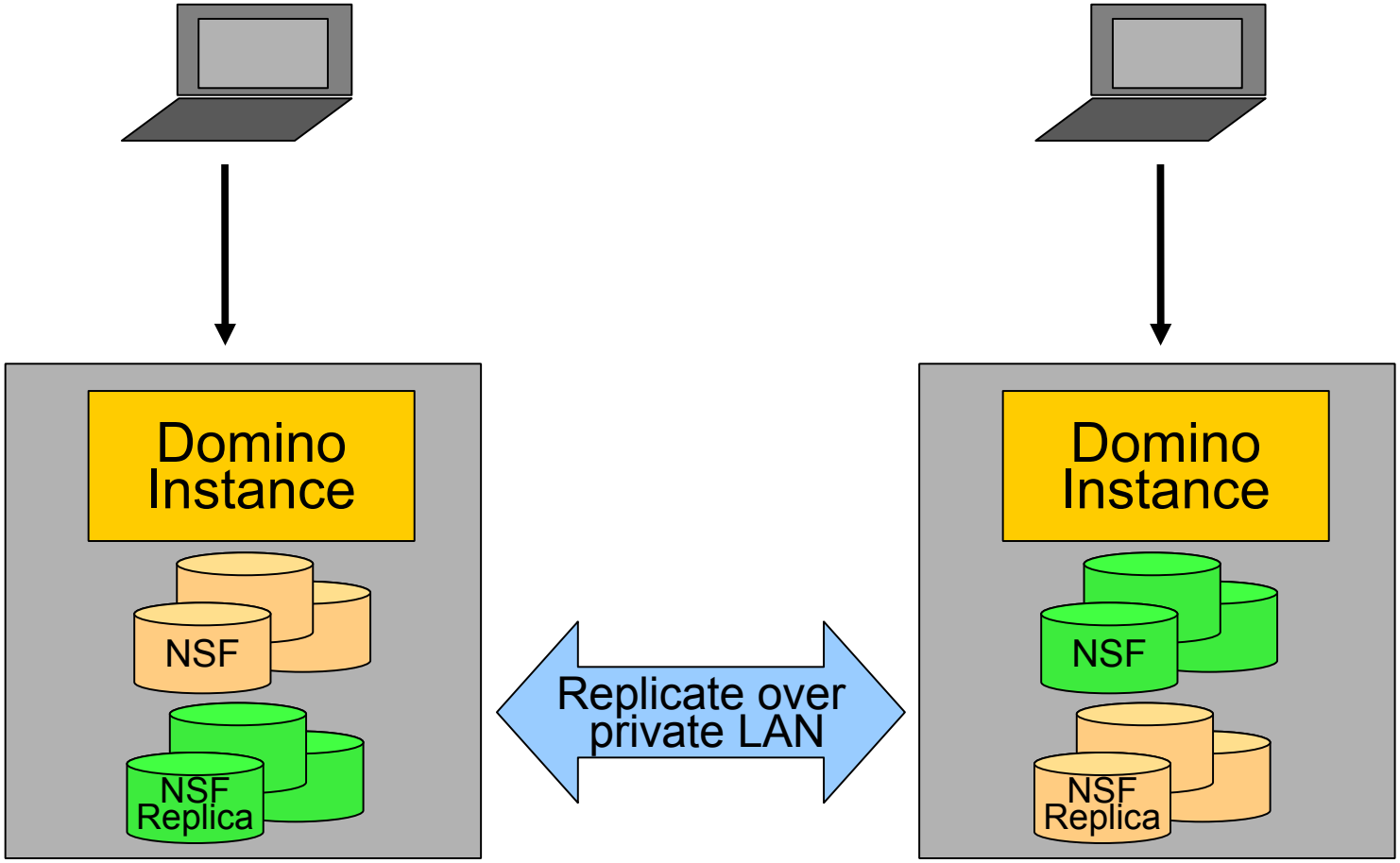
Domino Clustering – Active / Hot-Standby



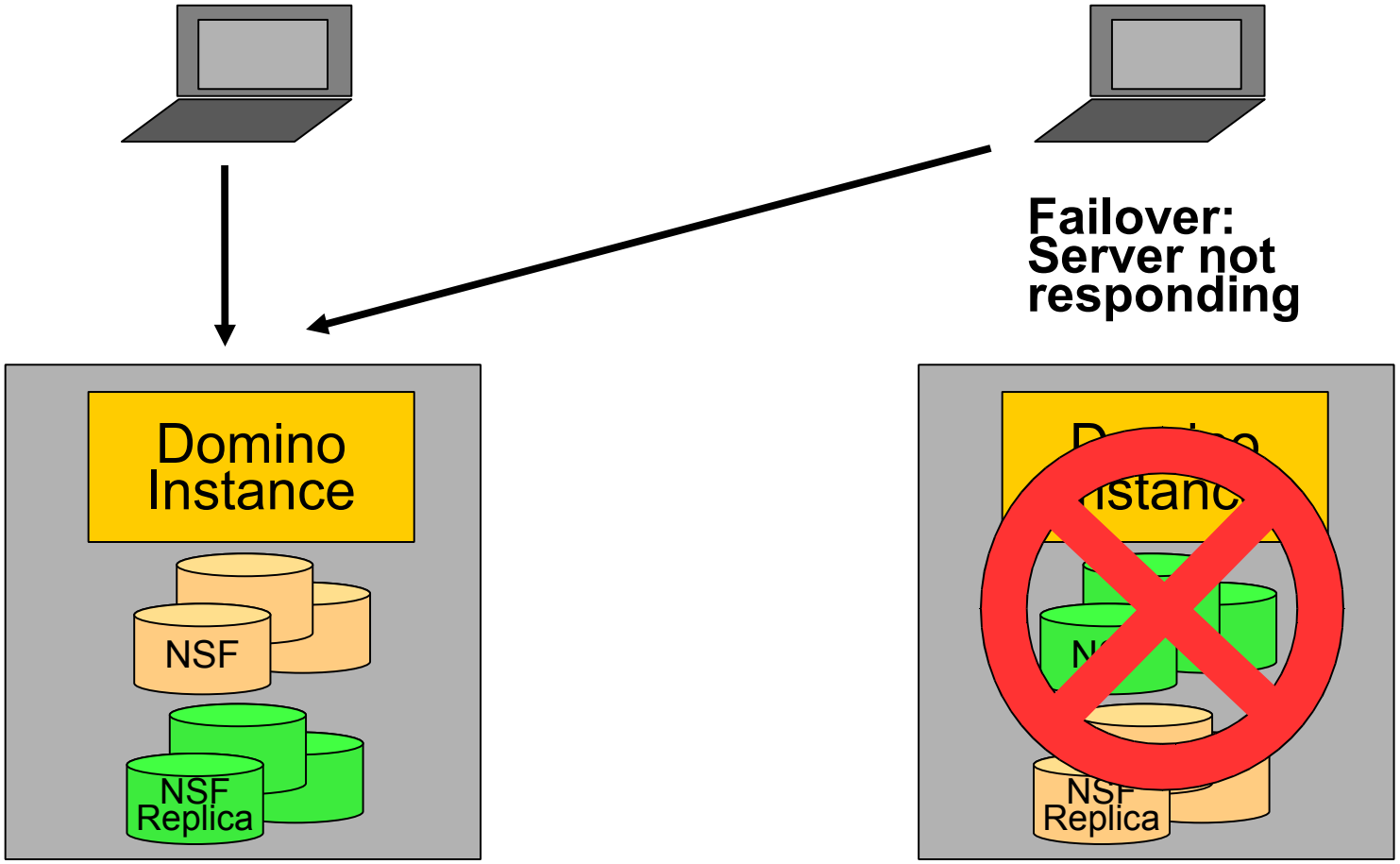
Domino Clustering – Active / Hot-Standby



Domino Clustering – Active / Active



Domino Clustering – Active / Active



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- Best Practices for Deployment on Linux for System z

Lotus Domino on System z

- **Lotus Domino 6.5 added support for System z**
- **Available Options**
  - Lotus Domino on z/OS: z/OS Version 1 Release 7 or later
  - Lotus Domino on Linux for System z:
    - Novell SUSE Linux Enterprise Server (SLES) 10 on System z (64bit)
    - Red Hat Enterprise Linux (RHEL) 5 on System z (64bit)
- **Lotus Domino running as 31bit application in compatibility mode**
  - Access up to 2GB of memory per Domino instance
  - 64bit support planned for Lotus Domino 8.5 on Linux for System z
- **Domino APIs are identical on all platforms**
  - Native applications written only against C-API need recompile for specific platform

Cutting-edge technology on System z
Adapted for other platforms

- **Domino 6.5 on Linux for System z uses sys-epoll / libpthread functionality implemented in SLES8 for System z**
  - More than 1000 concurrent users per Domino server instance possible
  - Migrated to System x by special Extension Pack for Lotus Domino 5 and 6 for SUSE Linux Enterprise Server 8 SP3
- **tunekrnl tunes special system settings at Domino startup**

Advantages for running Lotus Domino on System z

- **Same Hardware – Flexibility of Software**
  - High-available hardware
  - Depending on requirements and available skills you could use z/OS or Linux for System z
  - Run thousands of Mail and Application users using a single processor / IFL
  - Scale virtualized hardware resources depending on demand (Capacity on Demand)
- **Mission Critical Applications**
  - High-availability combined with First-Failure Data Capture
  - Domino on System z can integrates well in an existing Disaster Recovery Strategy

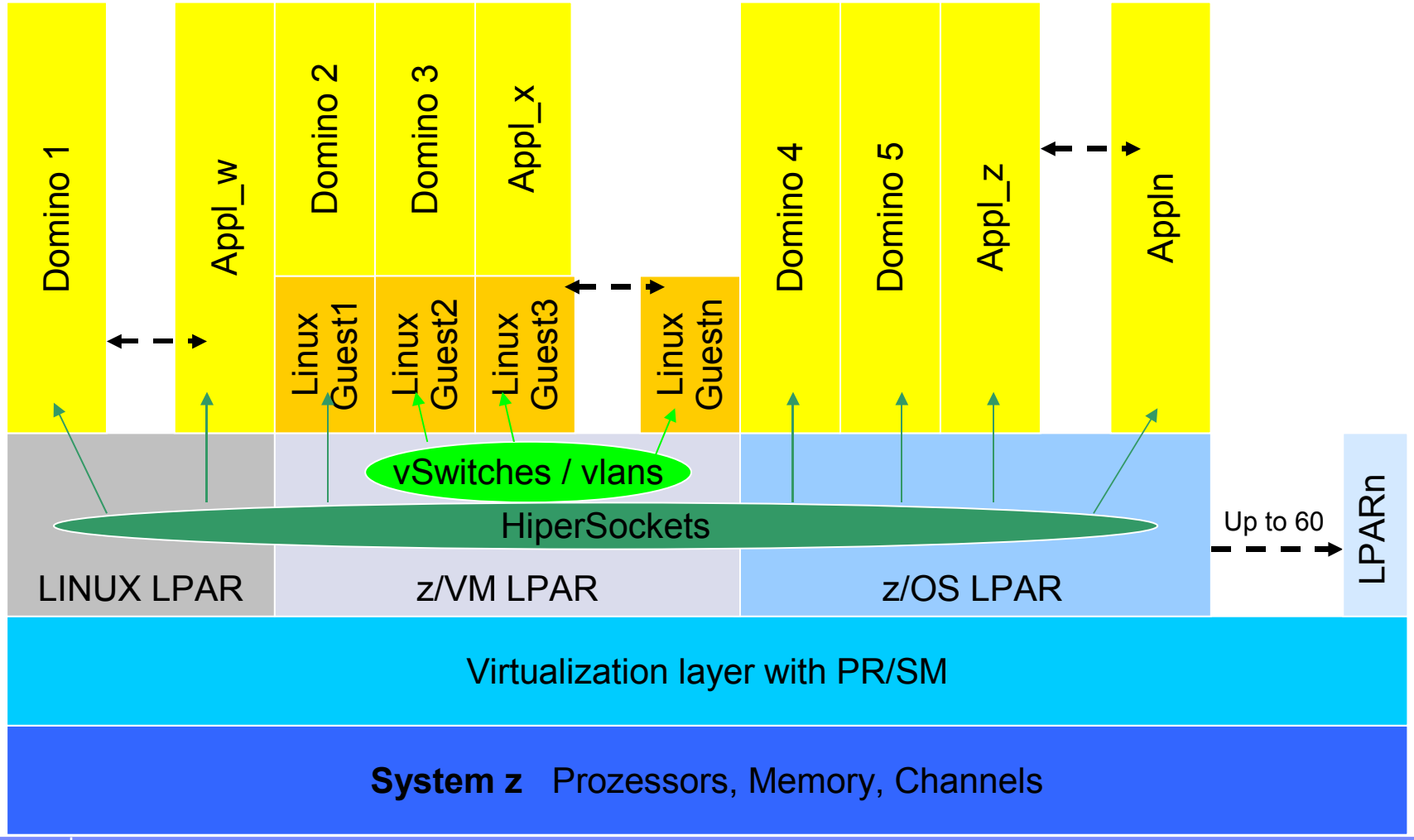
Server Consolidation using Lotus Domino on System z

- **Reduce administrative and licensing costs**
- **On/Off Capacity on Demand**

- **Consolidate existing Domino Servers on a single box**
  - Keep existing logistical structures
  - Eliminate network traffic – running in memory
  - Possible using LPAR and z/VM

- **Consolidate number of Domino Servers**
  - Migrate servers to System z platform and reduce number of Domino Servers by using scalability of System z
  - Possible using LPAR and z/VM

System z Ressource Sharing



Domino on Linux for System z in z/VM guests

- **Virtualize a large number of images using z/VM**
  - Configure different guests for production, development and test environments
  - Set different priorities
- **Combine advantages of Linux and System z**
  - High Security Level:
    - EAL5 Certification for LPAR-Security
    - EAL 4+ Certification for SUSE Linux Enterprise Server and Red Hat Enterprise Linux
  - Load Isolation between guest images
- **Reuse existing Linux skill**
- **Scale-Up and Scale-Out**
  - Dynamically add resources (Capacity on Demand)
  - Add users to existing Domino partition
  - Vertical scaling of Lotus Domino by adding new Domino Partitions to a Linux system running in a LPAR
  - Horizontal scaling by adding new LPARs running Linux – Cloning of Linux Virtual Servers

*EAL ... Evaluation Assurance Level (Common Criteria for Information Technology Security Evaluation)

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File System Partitioning

- **General**
  - Use Logical Volume Manager (LVM) enables you to resize file-systems
  - Use Journaling Filesystem (recommended: ext3)
  - Put each Volume Group on separate physical disk/virtual SAN disk
- **System Partition**
  - Includes Linux operating system and Lotus Domino program binary /opt/ibm/lotus
  - Size: 10GB
- **Swap Partition**
  - Size: at least 2GB recommended
  - Better to add memory dynamically

File System Partitioning (cont'd)

- **Data Partition /local/notesdata**
  - Size: Depends on number and size of mail boxes / applications data – but keep at least 20-30% free space
  - Use mount option “noatime” to avoid logging of access time to files
- **Transaction-Log Partition**
  - Size: 5 GB
  - Use mount option “noatime”
- **View-Rebuild Partition**
  - Size: 3-4 GB
  - Use mount option “noatime”

Linux System Configuration – Required Packages

- **Ensure that compat libraries are installed**
  - compat-libstdc++-33
- **Install gdb (GNU Debugger) which is used by NSD (Notes System Diagnostics)**
- **Install sysstat to get platform statistics using *iostat***
- **RedHat Enterprise Linux 5 only: Install libXp and libXmu**
- **For 64-Bit Linux environments: Ensure that 31bit libraries are installed (glibc-31bit, ...)**

Linux System Configuration – Security Settings

- **Disable SELinux (RHEL) / AppArmor (SLES)**
  - This is currently not supported
- **Configure Firewall for your needs and the services provided by Domino**
  - SSH (port 22) – for administrative access
  - LDAP (port 389) and Secure LDAP (port 636)
  - SMTP (port 25) and SMTP SSL (port 465)
  - IMAP (port 143)
  - POP3 (port 110) and Secure POP3 (port 995)
  - NRPC (port 1352)
  - HTTP (port 80) and HTTPS (port 443)
  - ... any other port you are going to use ...

Linux System Configuration – Duplicate Services

- **Ensure that services are disabled which should also be provided by Domino**
  - Mail transfer agent (for example postfix)
  - Webserver (for example Apache)
  - LDAP (for example OpenLDAP)
  - IMAP / POP3 (for example cyrus)

Linux System Configuration

- **Add runtime user *notes* which is member in group *notes***
- **Add DOMINO_LINUX_SET_PARMS to /home/notes/.bashrc**
  - Automatically runs tunekrnl at Domino startup

```
export DOMINO_LINUX_SET_PARMS=1
```

- **Modify /etc/security/limits.conf to set number of open files for *notes***

```
notes soft nofile 49152
notes hard nofile 49152
```

- **Modify /etc/security/limits.conf to set number of processes/threads for *notes***

```
notes soft nproc 12500
notes hard nproc 12500
```

Linux System Configuration (cont'd)

- **Install Lotus Domino using configured runtime user *notes* and group *notes***
- **Use an Init-Script created by LIC to start Lotus Domino during system boot**
  - Send mail to maik.weber@de.ibm.com

Domino Tuning

- **Try to keep default values !**
- **There is no one-fits-all setting**
  - If that's the case, then it would be the default.
- **Use these notes.ini configuration only to better utilize free resources**
  - Test it !

Domino Tuning – Interesting Notes INI settings

SERVER_POOL_TASKS

- Maximum number of initial thread pool tasks for the Domino server

SERVER_MAX_CONCURRENT_TRANS

- Maximum number of concurrent I/O threads which can be run at the same time by the Domino server

NSF_BUFFER_POOL_SIZE_MB

- Size of the NSF buffer pool, which is the dedicated section of memory dedicated to buffering I/O transfers between Lotus Domino and the operating system

NSF_DbCACHE_MAX_ENTRIES

- Number of databases for which a server can hold information at one time in its database cache

Detailed description in Backup section

Summary

IBM Lotus Domino

A secure Messaging and Collaboration Platform

- Free Choice and Flexibility
  - Hardware Platform, Operating System, Directory, Client Access
- Low Cost Of Ownership
  - Policy Based Administration, Network Bandwith, Server Storage, Quota Management, Smart Upgrade, Scalability
- Integrated End-to-End Security
  - Granular Level: Server, Database, View, Document, Field.
  - Integrated Seamless PKI Encryption. Document Encryption, Digital Signatures. Execution Control Lists
  - Smartcards
- Quality of Service
  - Clustering for Failover and Load-Balancing
  - Transaction Logging, Automated Server Restarts and Diagnostic Data Collection
  - Advanced Administration Tools, Statistics and Events, Domino Domain Monitoring

Thank you :-)

maik.weber@de.ibm.com

Resources

Resources

- **Lotus Domino Product page**
  http://www.ibm.com/lotus/domino
- **The History of Notes and Domino**
  http://www.ibm.com/developerworks/lotus/library/ls-NDHistory/
- **Best Practices for Lotus Domino on System z: z9 and zSeries**
  http://www.redbooks.ibm.com/abstracts/sg247209.html
- **Lotus Domino 7 on Linux for IBM System z: Capacity Planning and Performance Updates**
  http://www.redbooks.ibm.com/redpapers/abstracts/redp4109.html
- **Lotus Domino 7 on System z**
  http://www.ibm.com/developerworks/lotus/library/domino7-zseries/index.html
- **OpenNTF.org**
  http://www.openntf.org

Backup

Domino Tuning – SERVER_POOL_TASKS

- **SERVER_POOL_TASKS=20 (default = 20, values up to 160)**
  - This variable defines the maximum number of initial thread pool tasks (IOCP* threads) for the Domino server.
  - By default a value of 20 is used.
- **Increment that value in steps of 20 when CPU and I/O load are still low.**

* IOCP – I/O Completion Ports

Domino Tuning – SERVER_MAX_CONCURRENT_TRANS

- **SERVER_MAX_CONCURRENT_TRANS=100**
  - This variable defines the maximum number of concurrent I/O threads which can be run at the same time by the Domino server.
  - It is used as a throttle to reduce CPU usage and Context Switches.
  - By default a value of 100 is used.
- **The recommended setting is SERVER_POOL_TASKS x # of Domino ports active on server, but at least 2x.**
- **Increment that value in accordance to SERVER_POOL_TASKS.**

Domino Tuning – NSF_BUFFER_POOL_SIZE_MB

- **NSF_BUFFER_POOL_SIZE_MB=xxxx**
  - Defines the size of the NSF buffer pool, which is the dedicated section of memory dedicated to buffering I/O transfers between Lotus Domino and the operating system.
  - The size is dependent on the amount of memory available in the system.
  - Good starting point 3/8 of available memory
- **Check with show stat and look for Database.Database.BufferPool.PerCentReadsInBuffer which should have a value in the above 90's. Should this not be the case the NSF_BUFFER_POOL variable needs to be increased.**
  - 90 % = OK
  - 95 % = Good
  - 98 % = Excellent

Domino Tuning – NSF_DbCACHE_MAX_ENTRIES

- **NSF_DbCACHE_MAX_ENTRIES=n**
  - This variable defines the number of databases for which a server can hold information at one time in its database cache.
  - This cache contains key information about recently opened databases. If the number is to small older databases will be removed from the cache.
  - The database cache size defaults to three times the size of the NSF_BUFFER_POOL_SIZE.
- **Recommendation: Around the number of concurrent users or number of databases on the server -whichever is higher**
- **Check with show stat and look for Database.DbCache.OvercrowdingRejections**
  - Should have a value close to 0. If not NSF_DbCACHE_MAX_ENTRIES value needs to be slowly increased.