Core Technology Update

Database Mirroring
Cloud Computing
Virtualization

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Agenda

• Cloud Computing
• Database Mirroring: HA and DR
• Virtualization
SaaS, PaaS, or DaaS:
Click Here for Your Choice of Cloud

CLOUD COMPUTING

Agenda

- The Cloud Computing Hurricane
- What is Cloud Computing, after all?
- How can the Cloud help me?
- With the focus on Breakthrough Applications:
  - An example of a Breakthrough SaaS offering
  - An example of a Breakthrough PaaS offering
- Some challenges, and how we’re addressing them
- Demo
- What’s available, when is it available, and what will it cost me?
- Futures
The Cloud Computing Hurricane

- Overly hyped?
  - True value exists, but hard to find given the marketing vortex that has spun up this hurricane

- Too many acronyms
  - SaaS, PaaS, DaaS, IaaS, XaaS = too many asS’s!!
  - Which is right for me?

- Too many definitions of The Cloud
  - Focus ought to be on “what characteristics make The Cloud?”, and “how can I exploit these characteristics?”

So, what is it?

Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider integration

- Key terms:
  - Convenient, on-demand access
  - Rapidly provisioned and released
  - Minimal management effort

-Paul Hamerman, Forrester Research
How Can The Cloud Help Me?

• Deploy Breakthrough Applications in The Cloud
  • Rapidly Provisioned
  • Massively Personalized (bespoke solution for each customer)

• What features of The Cloud can benefit me?
  • Pay-as-you-go
  • Virtually *infinite* computing resources
  • Elastic
  • Provision on-demand
  • Stay lean and agile

Breakthrough SaaS: A few thoughts

• Deliver what people want, when they want
• Quickly provision the architecture to meet a specific need/scale
• Be elastic – grow/shrink as demand increases/decreases
• Channel Mary Poppins & her magic bag of tricks
  • Bespoke solution for each situation (i.e., customer)
  • Each and every solution can be different
  • Very quickly build an infrastructure from scratch, and deploy your application to meet the customer’s needs
Breakthrough PaaS: A few thoughts

- Consider the Eli Lilly ‘IT Vending Machine’
  - Researches @ Eli Lilly were wasting time and resources while waiting for systems to be provisioned to allow them to run specific modeling (hypothesis validation)
  - The IT department was actually *hurting* productivity
  - Eli Lilly developed an ‘IT Vending Machine’
    - One-stop-shop for researchers to launch any application
    - Single-click deployment of servers running fully configured apps
    - Truly self-serve platform

- How can you empower your users to leverage such features of The Cloud?

Some Challenges

- There are *many* challenges in The Cloud
- The 2 biggest (initial) pain points are:
  - Deploying & Managing systems
  - Deploying & Managing applications

- How is InterSystems going to help you?
  - Unique partnership with RightScale ([www.rightscale.com](http://www.rightscale.com))
  - Single-click deployment framework
    - For Caché & Ensemble
    - Plus, recipes to help you deploy your complete app with a single-click!
Some other challenges…

• **Security & Privacy**
  - PCI, HIPAA, PHI, etc.
  - Public cloud service providers are trying to establish guidelines which will enable cloud-running applications to meet the various rules and regulations

• **How can InterSystems technology help you?**
  - Database encryption
  - User-based / role-based security

Demo

• **Single-click deployment**
  - Amazon EC2 Cloud, running a
  - Windows Server, with
  - Caché 2012.1.0 installed

• **Made possible by RightScale’s framework**
  - InterSystems develops and maintains Caché & Ensemble ServerTemplates in the RightScale framework
  - You get to use it as-is, or
  - You get to import it and customize it (i.e., add on your application-specific touches)

• Note: demo video will be made available later – check back on [http://www.intersystems.com](http://www.intersystems.com)
What’s available, and when?

• RightScale Server Templates:
  • Caché on Win 2008 R2 x64: June 1, 2012 ➞ NOW!
  • Ensemble on Win 2008 R2 x64: ~June 2012

• Documentation:
  • http://support.rightscale.com/27-Partners/InterSystems
  • RightScale public library: June 2012
  • InterSystems website (microsite): June/July 2012

Licensing & Cost

• BYO InterSystems License
  • Existing license will work in The Cloud
  • No extra charge from InterSystems

• RightScale licensing
  • Free version – explore, develop, test
    • Set up free account; call RightScale & ask for VIP upgrade
    • “Try-before-you-buy” - ~60-day trial
  • Paid (Enterprise) version – deploy, sell

• Infrastructure Provider
  • Amazon EC2 – pay-as-you-go
    • Remember: server cost, data transfer cost, EBS (storage) cost
Futures

- SuSE Linux in Amazon EC2
- Other Cloud Service Providers
  - Public: Rackspace, etc…
  - Private: CloudStack, etc…
- Other pricing models…

Wrap-up: Cloud Computing

- Demo instance – running yet?
- Questions?
- Please let us know your cloud plans…
- We’re delighted to assist your success in The Cloud!
High Availability (HA)
Disaster Recovery (DR)

DATABASE MIRRORING

Why HA & DR?

Estimated downtime costs (per hour)

- $42,000 – Gartner
- $72,000 – Healthcare
- $6,000,000 – Global Investment Bank
- $7,200,000 – PayPal
Traditional HA Trade-offs

The Levels of Availability

- Redundant Systems
- Cold Standby
- Warm Standby
- Automatic Failover
- Continuous Availability

Cost Complexity/Availability

Cost of Availability

Availability Cost Curve

Source: Gartner Research
Database Mirroring

A Mirror is a grouping of 2 Failover Members (Caché Systems); one becomes the Primary, the other becomes the Backup

Data flows from the Primary to the Backup; Acknowledgements flow from the Backup to the Primary

Mirror updates are synchronized through the Caché Journaling Process on the Primary

Enterprise Cache Protocol
Application Servers connect directly to running Primary

External systems connect through Mirror Virtual IP

Database Mirroring - Benefits

- Lower cost
- Faster failover
- Easier maintenance
### Lower Cost

![Cost Comparison Graph](image1)

#### Lower Cost by Category

![Cost Percentage Graph](image2)
Faster Failover

• Warm failover process
• Warm fail back
• Takes seconds instead of minutes

Faster Failover Examples

Recent TrakCare benchmark
• ECP
  • 3,400 concurrent users: MTTR 11 sec
  • 10,200 concurrent users: MTTR 47 sec
    • Special ECP split-datacenter configuration
    • Extra time for additional ECP recovery from more app servers

• Single Server
  • 3,400 concurrent users: MTTR 16 sec
Easier Maintenance

Most InterSystems upgrades can be done “In Place” with little or no downtime!

Async Member

[Diagram showing variousasync members and their connections, illustrating a distributed system architecture.]
Async Member: Sample Architecture

Async Member New Features

• Reporting Read/Write and Read-Only (2012.2) – System-wide property to allow Async Member to be used as DR system or reporting system in Read/Write or Read-Only mode

• Switch-Over/Switch-Back (2012.2) – Seamless “pushbutton” process to switch to Async DR, and return to original production system
Async Relay/Cascade (Future)

Async Filter (Future)

Record-based Filtering Available

Filter A, B

Filter A, C, D

Filter B, C, D

Mirrored Databases
Shadowing Status

- Shadowing
  - Will continue to support (including bug fixes)
  - No new innovation – feature frozen since 2011.1
- Async Mirroring is preferred for Disaster Recovery

Customers Live w/ Mirroring

Caché
- MFS (USA)
- Indian Health Services (USA)
- LKQ (USA)
- NEWTEC (Germany)
- Realisator AG (Switzerland)
- PCS (UK)
- CareGroup (USA)
- Lille (France)

Ensemble/HSF
- Kettering Health Network (USA)
- Spectrum Health (USA)
- Mediterranean Shipping Company (Switzerland)
- William Beaumont Health Systems (USA)
- West Middlesex University Hospital (UK)
- The Queen’s Medical Center (Q2, 2012) (USA)
- Ipiranga (Q2, 2012) (Brazil)
- Seattle Children’s Hospital (Q2, 2012) (USA)
- University Physicians of Denver (Q3, 2012) (USA)
### Customers Planning/Evaluating Mirroring

- TrakCare (Worldwide)
- Indian Health Services (USA)
- QuadraMed (USA)
- Epic (Worldwide)
- LabCorp (USA)
- Quest Diagnostics (USA)
- Netsmart (USA)
- The Veterans Administration (USA)
- New York City Health and Hospitals (USA)
- Data Innovations (USA)
- MyLab (Finland)
- PetroBras (Brazil)
- Credit Suisse (UK)
- CSC (UK)
- BT (UK)
- Belgian Police (Belgium)
- IMAS (Spain)
- World Information Systems (USA)
- Ontario Systems (USA)
- Source Medical (USA)
General Note

Caché and Virtualization

InterSystems Products and Virtualization Software
August 3, 2009

It is InterSystems policy and procedure to verify and release InterSystems’ products against operating systems (e.g., Microsoft Windows, RedHat Linux, etc.) and processor types, and not computers (server, workstation, etc.) of various vendors. We consider virtualization software (e.g., Hyper-V, Parallels, VMware, etc.) to be in the same category as a computer.

InterSystems’ products released for an operating system are supported if the operating system is used within such a computer.

InterSystems has determined in benchmark and customer testing that virtualization environments running Caché, kinterbase, kudos or healthcare require greater CPU capacity than native installations on the same hardware. We also observed that advancements in chip and virtualization technology are producing constantly improving benchmark numbers.

InterSystems recommends that any customers contemplating a deployment into such a platform conduct application specific testing to ascertain what, if any, response time impact will be noticed by users.

From: InterSystems.com/Cache/Virtualization/

Virtualization – What is it?

Virtualization Fabricates Infrastructure & Operations (I&O), Delivering IT Efficiency Across Projects

Virtualization bridges:
- Sourcing
- Application
- Infrastructure
- Data center
Application Modernization
ERP Migration
Data Center Modernization
Hosted Virtual Desktop
Power & Cooling — Green
Virtualization

Virtualization is an IT scenario that drives many I&O trends.

Source: Gartner (August 2010)
Benefits of Virtualization

- Reduced Hardware (Consolidation)
- Increased Utilization
- “Easy” HA & DR
- “Rapid” deployment
- “Zero Downtime” Maintenance

Virtualization: What does it mean to YOU?

Common Options

- VMWare ESX/ESXi
- Novell Xen Server
- Microsoft Hyper-V
- IBM PowerHA (lpars, VIOS, micro-partitioning)
- HP VSE (Virtual Server Environment)
- HP OpenVMS Virtualization
- RedHat KVM
- SuSE Virtualization
- Others…
Performance

- CPU Type
  - Intel Xeon 5500, 5600, 7600, 7600 = good
  - AMD Opteron 6100 = good
  - Others? Not so good…

- Virtualization Software Version
  - VMWare ESX/ESXi 4.0+ = good
  - Others? Maybe OK… (test!)

IMPORTANT:
- Need both CPU type AND Virtualization Software Version!

Configuration

- CPU
  - Intel Nehalem/EX, Westmere/EX series
  - AMD Opteron 6100 series

- Memory
  - Lots & lots = good
  - Oversubscription = bad!

- Disk
  - Virtualized Disk?
  - Raw Device Mapping (RDM)?


**Configuration (cont.)**

- **Disk**
  - VMFS most common – needed for HA
  - RDM may be better for performance (sequential I/O)
- **HA features**
  - Examples: vMotion, Partition Mobility, Guest Availability, etc.
  - Needs good shared storage configuration
  - Needs adequate network bandwidth

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**Recent Benchmark**

- **HP DL980 G7** with 8 processors (Intel X7560) with 64 cores/128 threads and 1TB of physical memory.
- **Datastore 1**
- **Datastore 2**
- **EVA 8400 SAN Storage**
- **RAID 5**
- Each VMFS volume: 1TB LUNs in vRAID5
- **Local/Internal disks only for ESXi 4.1 hypervisor. Guest/VMs boot from SAN.**

- **HP DL980 G7**
  - 8 vCPU
  - 32GB RAM
  - VMFS/VMK
  - SUSE 11 SP1 64-bit
**Benchmark Results**

- Excellent performance / scalability
- \( \text{vCPU} = 4 \): 2,000 users @ ~450,000 GREFs/sec
- \( \text{vCPU} = 8 \): 4,000 users @ ~850,000 GREFs/sec
- Performance ~EQUAL to bare metal (no HT)

**Virtualization References**

- VMWare VMFS/RDM comparison: [http://www.vmware.com/files/pdf/performance_char_vmf
  s_rdm.pdf](http://www.vmware.com/files/pdf/performance_char_vmf
  s_rdm.pdf)
- General “good references”:
  - [http://www.vmware.com/pdf/Perf_Best_Practices_vSphere
    4.1.pdf](http://www.vmware.com/pdf/Perf_Best_Practices_vSphere
    4.1.pdf)
    pen](http://www.redbooks.ibm.com/abstracts/sq247590.html?O
    pen)
Thank You For Attending!

Q & A