



# XAP 10 – MemoryXtend Tutorial



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What this tutorial is all about?

**This tutorial will guide you  
how to experiment with  
XAP 10 MemoryXtend**

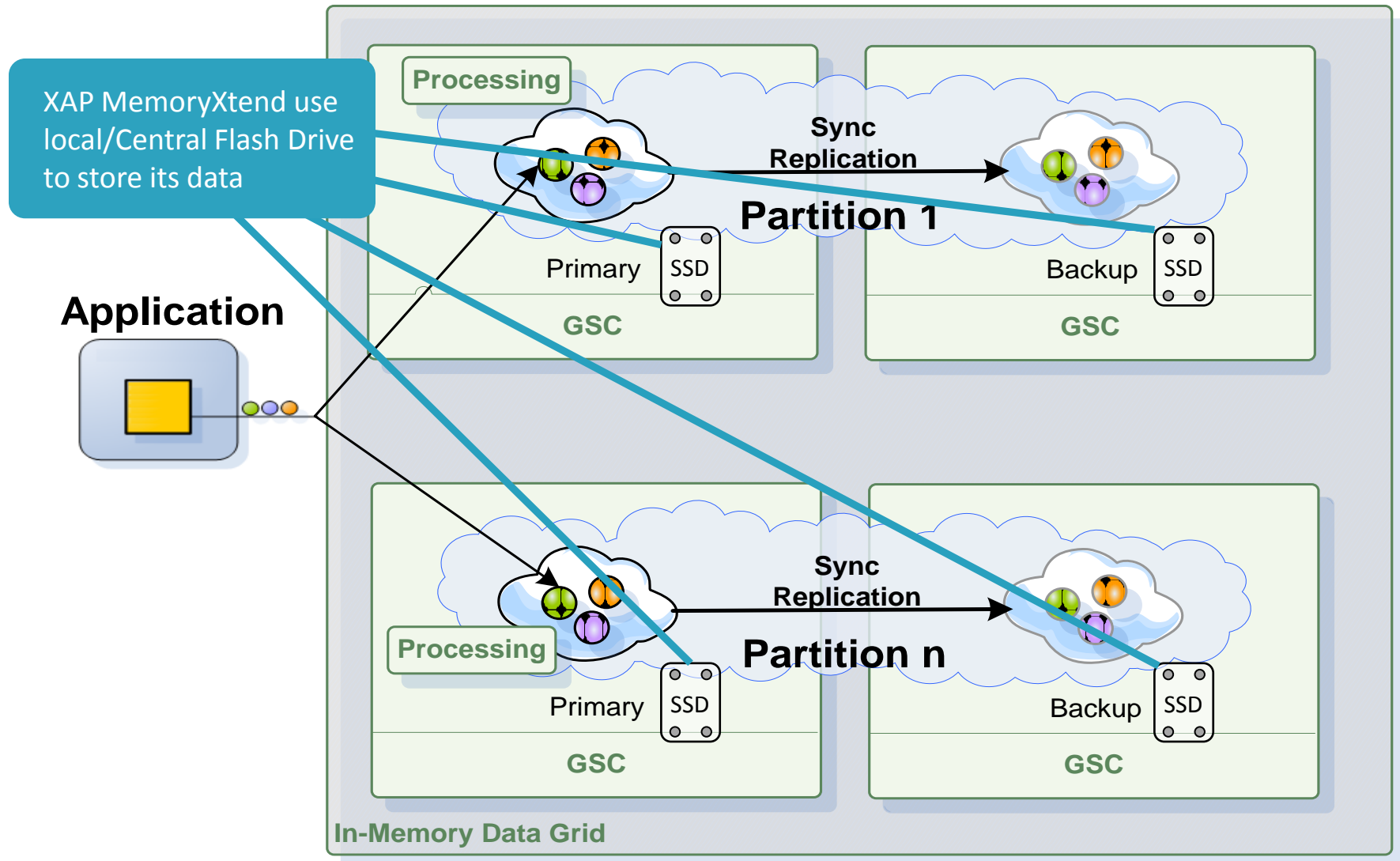
# XAP 10 MemoryXtend Full Documentation

- <http://docs.gigaspace.com/xap100adm/blobstore-cache-policy.html>
- <http://docs.gigaspace.com/faq/blobstore-cache-policy-faq.html>

# XAP MemoryXtend

- **Deploy high capacity Data Grid with minimal RAM utilization**
- **No lock-in**
  - All Enterprise flash drives are supported. SanDisk, Fusion-IO, Intel® SSD , etc are supported with the XAP IMC-SSD technology. Central SSD (RAID) devices such as Tegile, Cisco Whiptail, DSSD, and Violin Memory are also supported.
- **All data access routines supported**
  - XAP IMC data retrieval via a key or via SQL is fully supported. IMC Data grid indexes are maintained on-heap (RAM) for fast update and access.
- **Interoperability - All XAP IMC APIs are supported.**
  - Including the Space API (POJO and Document), JDBC API, JPA API, JMS API, and Map API ,Rest API , .Net API and C++ API.
- **All data-grid clustering topologies supported**
  - Allows grid based SSD storage configuration with one-click deployment , including multi-cluster multi-data center configuration across remote geographies.
- **Extensive Management**
  - Vast number of statistics available in real-time for optimized SSD utilization , and fine tuning based on the application data access pattern.
- **Intelligent multi-level DRAM caching**
  - Configurable flash management algorithms to optimize different workloads
- **Various durability levels supported**
  - both write-through or writeback (write-behind) for maximum write performance.

# XAP MemoryXtend – SSD based Data-Grid



# Tutorial Structure

<b>Cloud Instance setup .....</b>	<b>5 min</b>
<b>Cloud Instance bootstrap .....</b>	<b>5 min</b>
<b>SW download .....</b>	<b>5 min</b>
<b>SW Install .....</b>	<b>5 min</b>
<b>XAP Configuration .....</b>	<b>5 min</b>
<b>XAP Startup .....</b>	<b>5 min</b>
<b>RAM vs. SSD Data Grid Benchmarks ....</b>	<b>10 min</b>

# Running XAP MemoryXtend on the EC2 Cloud

## Quick guide:

1. Create your EC2 Account
2. Login into the AWS Management Console
3. Select the AMI to start and configure it
4. Start the Instance
5. Download XAP 10 , blobstore RPM and JDK
6. Install JDK
7. Install XAP 10
8. Install XAP blobstore RPM
9. Configure blobstore data grid
10. Start the XAP agent
11. Deploy RAM and SSD Data Grids
12. Run your tests

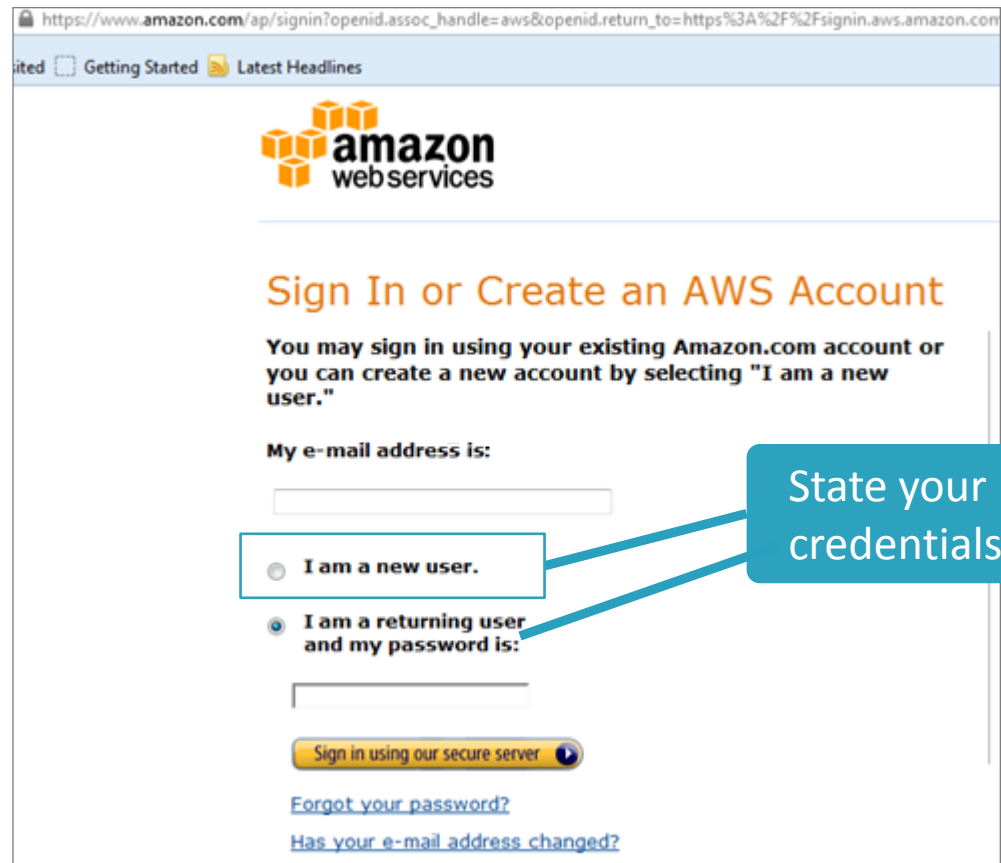
**We will use EC2 to start a VM with  
a Flash Drive.**

**You may use any other machine  
running Linux 6.x with SSD Flash  
Drive with this tutorial.**



# Login into the AWS Management Console

Open <http://aws.amazon.com/console/>



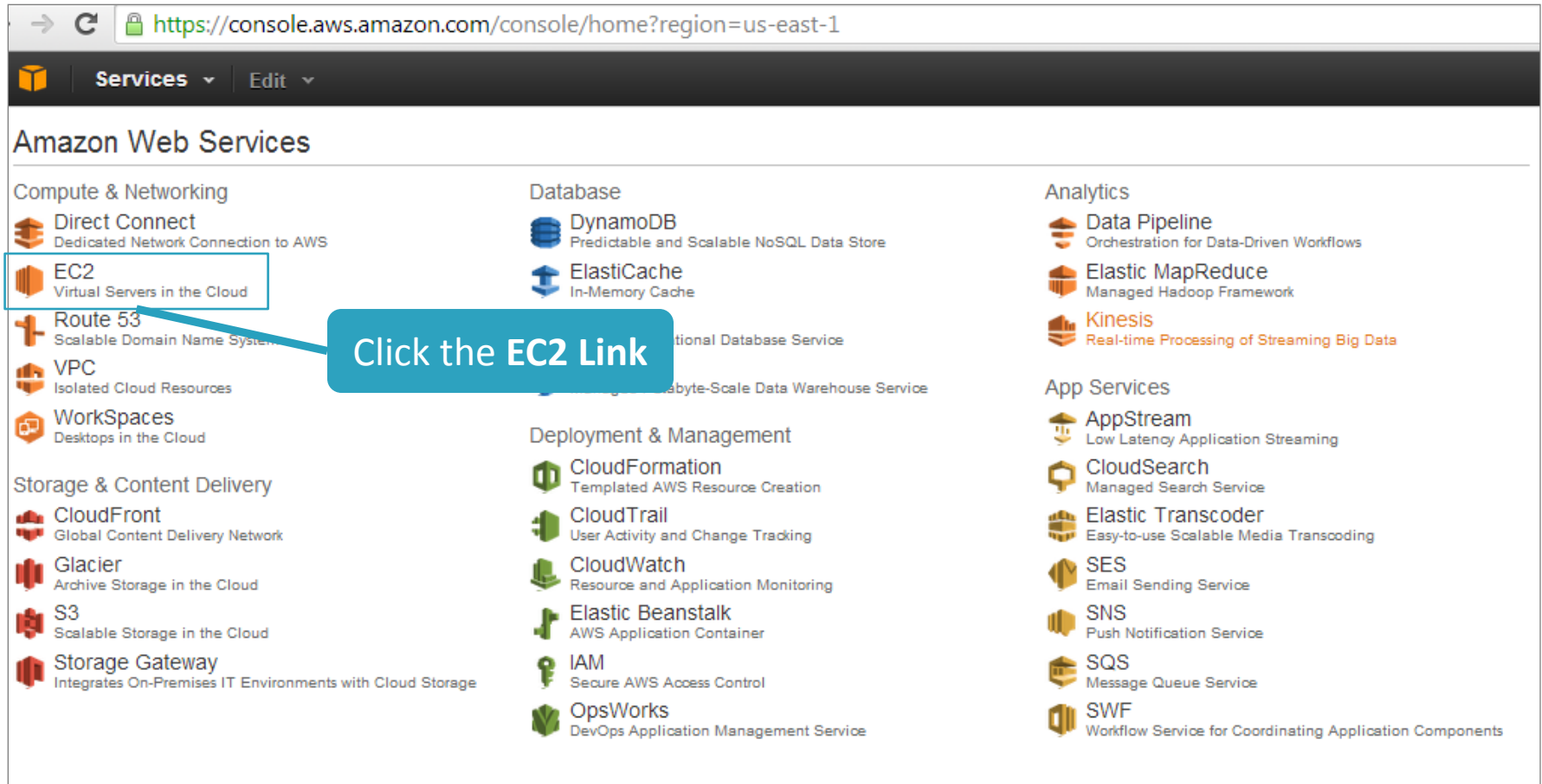
The screenshot shows the AWS Management Console login page. At the top, there's a navigation bar with links for 'Getting Started' and 'Latest Headlines'. Below this is the Amazon Web Services logo. The main heading is 'Sign In or Create an AWS Account'. The text below the heading says: 'You may sign in using your existing Amazon.com account or you can create a new account by selecting "I am a new user."'.

Below this text is a form with the following elements:

- A text input field labeled 'My e-mail address is:'.
- Two radio button options:
  - ☐ I am a new user.
  - ☒ I am a returning user and my password is:
- A text input field for the password.
- A yellow button labeled 'Sign in using our secure server' with a lock icon.
- Two links: '[Forgot your password?](#)' and '[Has your e-mail address changed?](#)'.

Two blue callout boxes with arrows point to the radio button options. The first box, labeled 'State your credentials', points to both the 'I am a new user' and 'I am a returning user' options.

# Access the EC2 Service panel



The screenshot displays the AWS Management Console interface. The browser address bar shows the URL <https://console.aws.amazon.com/console/home?region=us-east-1>. The console header includes the AWS logo, a 'Services' dropdown menu, and an 'Edit' button. Below the header, the 'Amazon Web Services' section is visible, categorized into several groups:

- Compute & Networking:** Includes Direct Connect, **EC2** (Virtual Servers in the Cloud), Route 53, VPC, and WorkSpaces. The EC2 link is highlighted with a blue box and a callout bubble that says 'Click the EC2 Link'.
- Database:** Includes DynamoDB and ElastiCache.
- Analytics:** Includes Data Pipeline, Elastic MapReduce, and Kinesis.
- App Services:** Includes AppStream, CloudSearch, Elastic Transcoder, SES, SNS, SQS, and SWF.
- Storage & Content Delivery:** Includes CloudFront, Glacier, S3, and Storage Gateway.
- Deployment & Management:** Includes CloudFormation, CloudTrail, CloudWatch, Elastic Beanstalk, IAM, and OpsWorks.

# Start the New Instance Wizard

The screenshot shows the AWS Management Console for the US West (Oregon) region. The left sidebar contains a navigation menu with categories like EC2 Dashboard, INSTANCES, IMAGES, ELASTIC BLOCK STORE, NETWORK & SECURITY, and AUTO SCALING. The main content area is titled 'Resources' and lists various EC2 resources: 1 Running Instance, 16 Volumes, 9 Key Pairs, 0 Placement Groups, 4 Elastic IPs, 1 Snapshot, 0 Load Balancers, and 5457 Security Groups. Below this is a 'Create Instance' section with a 'Launch Instance' button highlighted by a blue box. A callout bubble points to this button with the text 'Click the Launch instance'. The 'Service Health' section shows that the US West (Oregon) service is operating normally across all three availability zones (us-west-2a, us-west-2b, us-west-2c). The 'Scheduled Events' section shows no events for the US West (Oregon) region.

Services Edit

EC2 Dashboard

- Events
- Tags
- Reports

INSTANCES

- Instances
- Spot Requests
- Reserved Instances

IMAGES

- AMIs
- Bundle Tasks

ELASTIC BLOCK STORE

- Volumes
- Snapshots

NETWORK & SECURITY

- Security Groups
- Elastic IPs
- Placement Groups
- Load Balancers
- Key Pairs
- Network Interfaces

AUTO SCALING

- Launch Configurations
- Auto Scaling Groups

Resources

You are using the following Amazon EC2 resources in the US West (Oregon) region:

- 1 Running Instance
- 16 Volumes
- 9 Key Pairs
- 0 Placement Groups
- 4 Elastic IPs
- 1 Snapshot
- 0 Load Balancers
- 5457 Security Groups

Focus on application development and offload database management to AWS - [Try Amazon RDS Now!](#)

Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

**Launch Instance**

Note: Your instances will launch in the US West (Oregon) region.

Service Health

Service Status:

- US West (Oregon): This service is operating normally

Availability Zone Status:

- us-west-2a: Availability zone is operating normally
- us-west-2b: Availability zone is operating normally
- us-west-2c: Availability zone is operating normally

[Service Health Dashboard](#)

Scheduled Events

US West (Oregon):

No events

# Choose an Amazon Image

← → ↻ <https://console.aws.amazon.com/ec2/v2/home?region=us-west-2#LaunchInstanceWizard:> Shay Hassidim (ec2se) Oregon Help

Services Edit

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Tag Instance 6. Configure Security Group 7. Review

Step 1: Choose an Amazon Machine Image (AMI) Cancel and Exit

☐ Free tier only ⓘ

**Red Hat Enterprise Linux 6.5 (PV) - ami-aa8bfe9a (64-bit) / ami-dc8ffaec (32-bit)**  
Red Hat Enterprise Linux version 6.5 (PV), EBS-backed  
Root device type: ebs Virtualization type: paravirtual Select  
64-bit 32-bit

**Red Hat Enterprise Linux 6.5 (HVM) - ami-5b697332**  
Red Hat Enterprise Linux version 6.5 (HVM), EBS-backed  
Root device type: ebs Virtualization type: hvm

**Red Hat Enterprise Linux 6.5 (PV) - ami-aa8bfe9a (64-bit) – Low-end SSD Storage**

**Red Hat Enterprise Linux 6.5 (HVM) - ami-5b697332 – High-End SSD storage – require prior registration**

← → ↻ <https://console.aws.amazon.com/ec2/v2/home?region=us-west-2#LaunchInstanceWizard:> Shay Hassidim (ec2se) Oregon Help

Services Edit

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Tag Instance 6. Configure Security Group 7. Review

Step 2: Choose an Instance Type

**Select any AMI with SSD Instance Storage**

Family	Type	Local SSD (GB)	Local SSD (IOPS)	Memory (GB)	Instance Storage (GB)	EBS-optimized Available	Network Performance
Micro instances <b>Free tier eligible</b>	t1.micro	up to 2	1	0.613	EBS only	-	Very Low
General purpose	m3.medium	3	1	3.75	1 x 4 (SSD)	-	Moderate
General purpose	m3.large	6.5	2	7.5	1 x 32 (SSD)	-	Moderate
<input checked="" type="checkbox"/> General purpose	m3.xlarge	13	4	15	2 x 40 (SSD)	Yes	High

# Choose an Instance Type

1. Choose AMI
2. Choose Instance Type
3. Configure Instance
4. Add Storage
5. Tag Instance
6. Configure Security Group
7. Review

## Step 2: Choose an Instance Type

Currently selected: i2.xlarge (104 ECUs, 32 vCPUs, 2.5 GHz, Intel Xeon E5-26/0V2, 244 GiB memory, 8 x 800 GiB Storage Capacity)

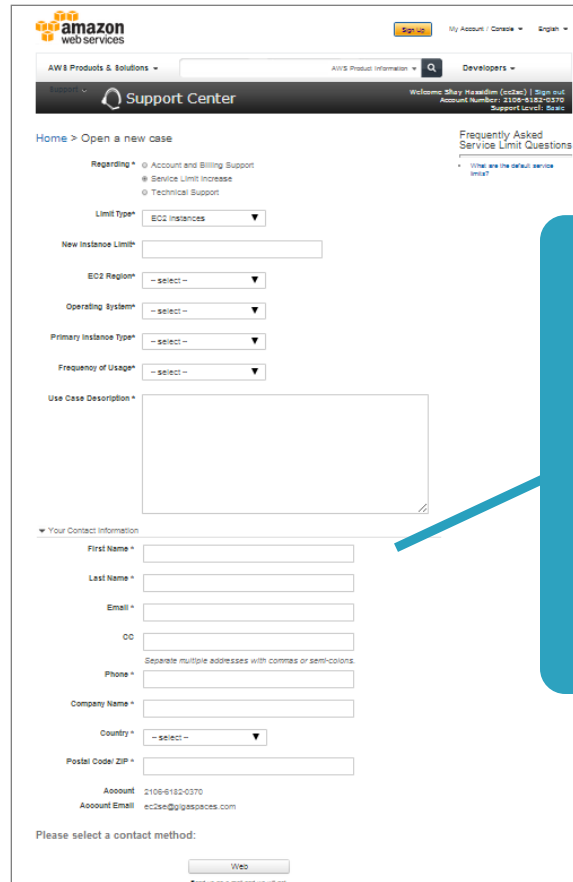
	Family	Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
<input checked="" type="checkbox"/>	Micro instances <b>Free tier eligible</b>	t1.micro	up to 2	1	0.613	EBS only	-	Very Low
<input type="checkbox"/>	General purpose	m3.medium	3	1	3.75	1 x 4 (SSD)	-	Moderate
<input type="checkbox"/>	General purpose	m3.large	6.5	2	7.5	1 x 32 (SSD)	-	Moderate
<input type="checkbox"/>	General purpose	m3.xlarge	13	4	15	2 x 40 (SSD)	Yes	High
<input type="checkbox"/>	General purpose	m3.2xlarge	26	8	30	2 x 80 (SSD)	Yes	High
<input checked="" type="checkbox"/>	General purpose	m1.small	1	1	1.7	1 x 160	-	Low
<input type="checkbox"/>	Compute optimized	c3.large	7	2	3.75	2 x 16 (SSD)	-	Moderate
<input type="checkbox"/>	Compute optimized	c3.xlarge	14	4	7.5	2 x 40 (SSD)	Yes	Moderate
<input type="checkbox"/>	Compute optimized	c3.2xlarge	28	8	15	2 x 80 (SSD)	Yes	High
<input type="checkbox"/>	Compute optimized	c3.4xlarge	55	16	30	2 x 160 (SSD)	Yes	High
<input type="checkbox"/>	Compute optimized	c3.8xlarge	108	32	60	2 x 320 (SSD)	-	10 Gigabit
<input type="checkbox"/>	GPU instances	g2.2xlarge	26	8	15	1 x 80 (SSD)	Yes	High
<input type="checkbox"/>	Memory optimized	r3.large	6.5	2	-	-	-	Moderate
<input type="checkbox"/>	Memory optimized	r3.xlarge	13	4	Yes	Yes	Moderate	
<input type="checkbox"/>	Memory optimized	r3.2xlarge	26	8	Yes	Yes	High	
<input type="checkbox"/>	Memory optimized	r3.4xlarge	52	16	Yes	Yes	High	
<input type="checkbox"/>	Memory optimized	r3.8xlarge	104	32	-	-	10 Gigabit	
<input type="checkbox"/>	Storage optimized	i2.xlarge	14	4	30.5	1 x 800 (SSD)	Yes	Moderate
<input type="checkbox"/>	Storage optimized	i2.2xlarge	27	-	61	2 x 800 (SSD)	Yes	High
<input type="checkbox"/>	Storage optimized	i2.4xlarge	53	16	122	4 x 800 (SSD)	Yes	High
<input checked="" type="checkbox"/>	Storage optimized	i2.8xlarge	104	32	244	8 x 800 (SSD)	-	10 Gigabit
<input type="checkbox"/>	Storage optimized	hs1.8xlarge	35	16	117	24 x 2048	-	10 Gigabit

i2.8xlarge and hs1.8xlarge  
are high-end SSD AMIs.  
Deliver good performance

Cancel
Previous
Review and Launch
Next: Configure Instance Details

# Increase your i2.8xlarge and hs1.8xlarge AMI Service limit

[https://aws.amazon.com/support/createCase?serviceLimitIncreaseType=ec2-instances&type=service limit increase](https://aws.amazon.com/support/createCase?serviceLimitIncreaseType=ec2-instances&type=service%20limit%20increase)



The screenshot shows the AWS Support Center interface. The main heading is "Home > Open a new case". Below this, there are radio buttons for "Regarding:" with options: "Account and Billing Support", "Service Limit Increase" (selected), and "Technical Support". The "Limit Type" is set to "EC2 instances". There are input fields for "New Instance Limit", "EC2 Region", "Operating System", "Primary Instance Type", and "Frequency of Usage", all with dropdown menus. A large text area is provided for "Use Case Description". Below this is a section for "Your Contact Information" with fields for First Name, Last Name, Email, CC, Phone, Company Name, and Country. At the bottom, there is a "Please select a contact method:" section with a "Video" button.

By default the i2.8xlarge and hs1.8xlarge are not available. You will need to fill in the form and request several instances. It takes about 2 days to get approval.

# Configure Instance Details

← → ↻ <https://console.aws.amazon.com/ec2/v2/home?region=us-west-2#LaunchInstanceWizard:> 🔍 ⌵ ☰

Services ▾ Edit ▾ Shay Hassidim (ec2se) ▾ Oregon ▾ Help ▾


1. Choose AMI 2. Choose Instance Type 3. Configure Instance 3. Configure Instance 4. Add Storage 5. Tag Instance 6. Configure Security Group 7. Review

## Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot Instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

**Number of instances** ⓘ

**Purchasing option** ⓘ ☐ Request Spot Instances

**Network** ⓘ   Create new VPC

**Availability Zone** ⓘ

**IAM role** ⓘ

**Shutdown behavior** ⓘ

**Enable termination protection** ⓘ ☐ Protect against accidental termination

**Monitoring** ⓘ ☐ Enable CloudWatch detailed monitoring  
[Additional charges apply.](#)

**EBS-optimized instance** ⓘ ☐ Launch as EBS-optimized instance  
[Additional charges apply.](#)

▼ **Advanced Details**

**Kernel ID** ⓘ

**RAM disk ID** ⓘ

**User data** ⓘ ☒ As text ☐ As file ☐ Input is already base64 encoded

Cancel Previous **Review and Launch** Next: Add Storage

Review the options and click the Add Storage button

# Add Storage

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Tag Instance 6. Configure Security Group 7. Review

## Step 4: Add Storage

Your instance will be launched with the following storage device settings. You can attach additional EBS volumes and instance store volumes to your instance, or edit the settings of the root volume. You can also attach additional EBS volumes after launching an instance, but not instance store volumes. [Learn more](#) about storage options in Amazon EC2.

Type ⓘ	Device ⓘ	Snapshot ⓘ	Size (GiB) ⓘ	Volume Type ⓘ	IOPS ⓘ	Delete on Termination ⓘ	Encrypted ⓘ
Root	/dev/sda1	snap-d353ee0c	10	Standard ▼	N/A	<input checked="" type="checkbox"/>	Not Encrypted
Instance Store 0 ▼	/dev/sdb ▼	N/A	N/A	N/A	N/A	<input type="checkbox"/>	Not Encrypted ✕
Instance Store 1 ▼	/dev/sdc ▼	N/A	N/A	N/A	N/A	<input type="checkbox"/>	Not Encrypted ✕
Instance Store 2 ▼	/dev/sdd ▼	N/A	N/A	N/A	N/A	<input type="checkbox"/>	Not Encrypted ✕
Instance Store 3 ▼	/dev/sde ▼	N/A	N/A	N/A	N/A	<input type="checkbox"/>	Not Encrypted ✕
Instance Store 4 ▼	/dev/sdf ▼	N/A	N/A	N/A	N/A	<input type="checkbox"/>	Not Encrypted ✕
Instance Store 5 ▼	/dev/sdg ▼	N/A	N/A	N/A	N/A	<input type="checkbox"/>	Not Encrypted ✕
Instance Store 6 ▼	/dev/sdh ▼	N/A	N/A	N/A	N/A	<input type="checkbox"/>	Not Encrypted ✕
Instance Store 7 ▼	/dev/sdi ▼	N/A	N/A	N/A	N/A	<input type="checkbox"/>	Not Encrypted ✕
Add New Volume							

Instance Store 0-7– will be used with the **blobstore device configuration**



# Tag the Instance

← → ↺ <https://console.aws.amazon.com/ec2/v2/home?region=us-west-2#LaunchInstanceWizard> 🔍 ☆ 🗨️ ☰

Services ▾ Edit ▾ Shay Hassidim (ec2se) ▾ Oregon ▾ Help ▾

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Tag Instance 6. Configure Security Group 7. Review

## Step 5: Tag Instance

A tag consists of a case-sensitive key-value pair. For example, you could define a tag with key = Name and value = Webserver. [Learn more](#) about tagging your Amazon EC2 resources.


Key (127 characters maximum)	Value (255 characters maximum)
Name	My SSD Test

Create Tag (Up to 10 tags maximum)

Cancel Previous **Review and Launch** Next: Configure Security Group

Will allow you to identify  
your instances

# Configure Security Group

 **Services** ▾ **Edit** ▾ Shay Hassidim (ec2se) ▾ Oregon ▾ Help ▾

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Tag Instance 6. Configure Security Group 7. Review






## Step 6: Configure Security Group

A security group is a set of firewall rules that control the traffic for your instance. On this page, you can add rules to allow specific traffic to reach your instance. For example, if you want to set up a web server and allow Internet traffic to reach your instance, add rules that allow unrestricted access to the HTTP and HTTPS ports. You can create a new security group or select from an existing one below. [Learn more](#) about Amazon EC2 security groups.


**Assign a security group:** ☒ Create a new security group ☐ Select an existing security group

**Security group name:**

**Description:**

Type 	Protocol 	Port Range 	Source 
All TCP ▾	TCP	0 - 65535	Anywhere ▾ 0.0.0.0/0 

**Add Rule**

 **Warning**  
Rules with source of 0.0.0.0/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only.

Make sure you select **Anywhere 0.0.0.0/0**

**Cancel** **Previous** **Review and Launch**

# Review and Launch

1. Choose AMI

2. Choose Instance Type

3. Configure Instance

4. Add Storage

5. Tag Instance

6. Configure Security Group

7. Review

## Step 7: Review Instance Launch

Instance Type	ECUs	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
i2.8xlarge	104	32	244	8 x 800	-	10 Gigabit

▼ Security Groups

Edit security groups

Security group name

launch-wizard-27

Description

launch-wizard-27 created on Thursday, May 29, 2014 10:35:58 PM UTC-4

Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ
All TCP	TCP	0 - 65535	0.0.0.0/0

► Instance Details

Edit instance details

▼ Storage

Edit storage

Type ⓘ	Device ⓘ	Snapshot ⓘ	Size (GiB) ⓘ	Volume Type ⓘ	IOPS ⓘ	Delete on Termination ⓘ	Encrypted ⓘ
Root	/dev/sda1	snap-d353ee0c	10	standard	N/A	Yes	Not Encrypted
ephemeral0	/dev/sdb	N/A	N/A	N/A	N/A	No	Not Encrypted
ephemeral1	/dev/sdc	N/A	N/A	N/A	N/A	No	Not Encrypted
ephemeral2	/dev/sdd	N/A	N/A	N/A	N/A	No	Not Encrypted
ephemeral3	/dev/sde	N/A	N/A	N/A	N/A	No	Not Encrypted
ephemeral4	/dev/sdf	N/A	N/A	N/A	N/A	No	Not Encrypted

Cancel

Previous

Launch

# Keep your key pair

Select an existing key pair or create a new key pair

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Choose an existing key pair

Select a key pair

mykey


☐ I acknowledge that I have access to the selected private key file (mykey.pem), and that without this file, I won't be able to log into my instance.

Cancel

Launch Instances

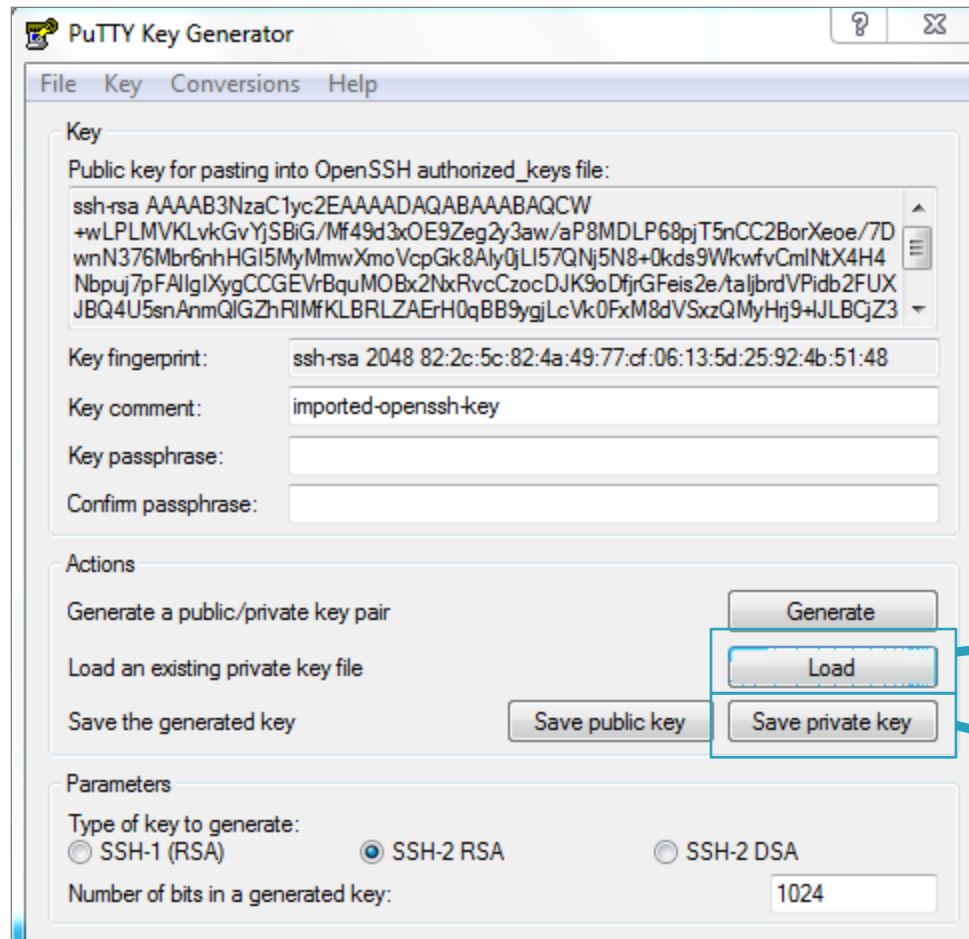
A pem file will be created. Keep it.  
You will need it in the next step.

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 GIGASPACE S

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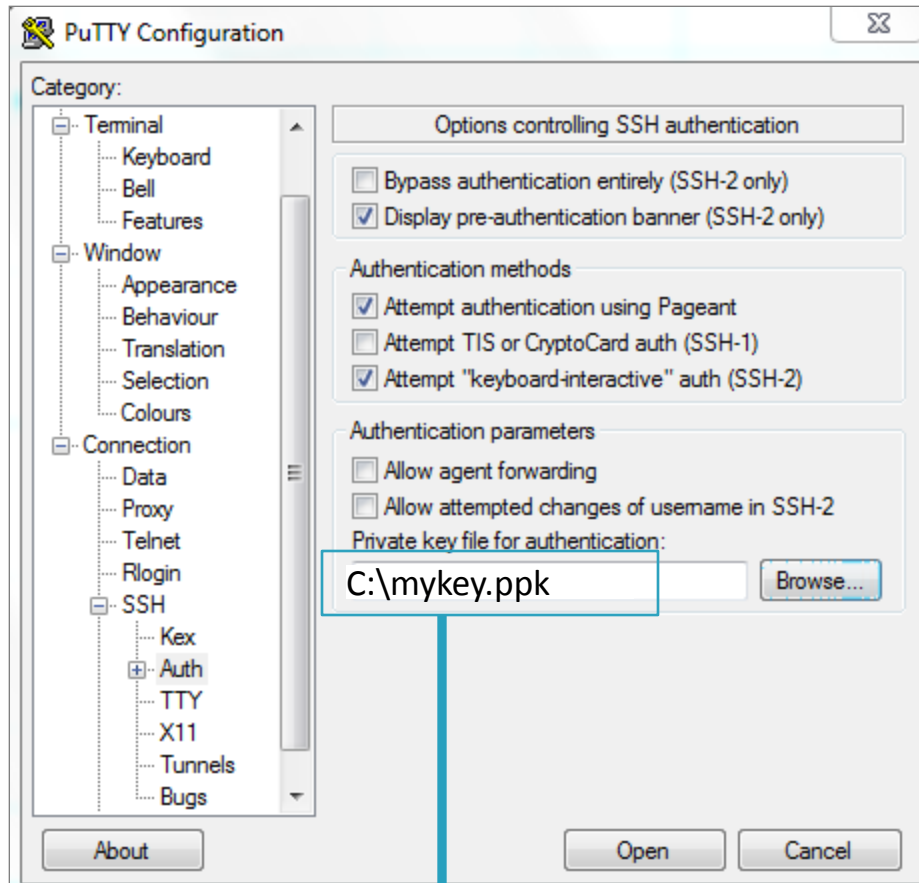
# Create a ppk file



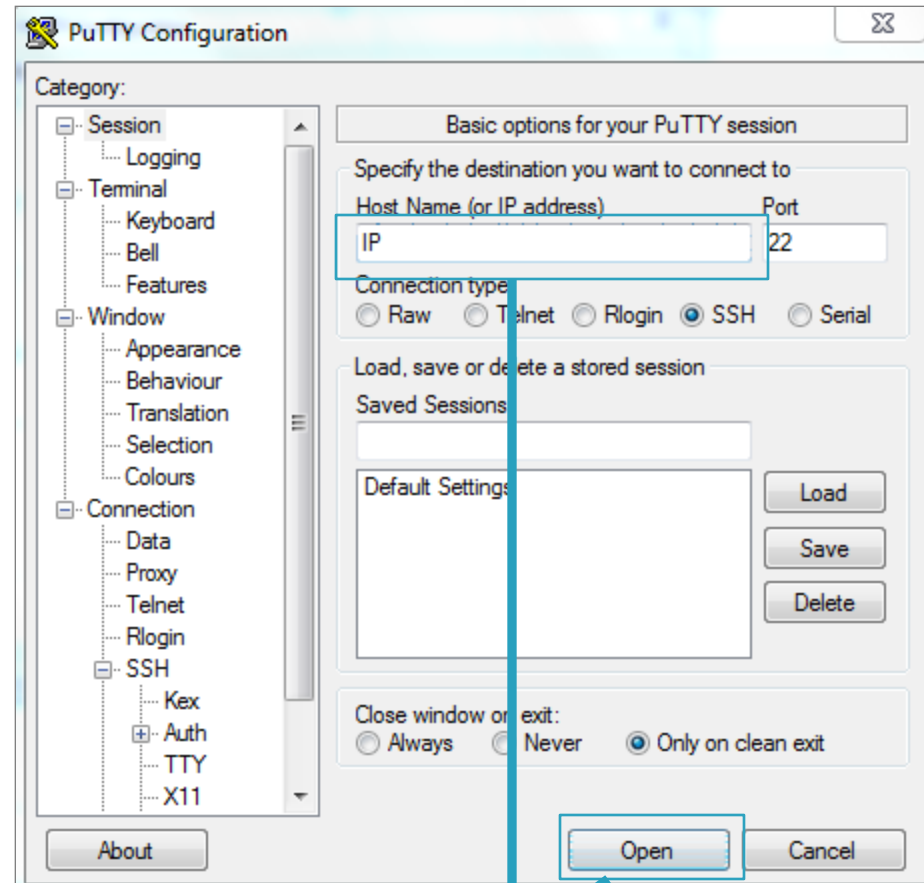
1- Click to load the pem file

2 - Click to generate a ppk file. Save the file.

# Access the Instance



1- Place the ppk file location generated earlier



2 – place the instance public IP and click Open

# What do you need to install?

- **One you have access to the instance on the cloud you will need to install the following:**
  - JDK 1.7 , 64 bit
  - XAP 10 - Java distribution
  - XAP 10 SanDisk ZetaScale libraries RPM

- Before installing move to root user using:  
**> sudo -s**



# Download and Install JDK 1.7

- `wget http://download.oracle.com/otn-pub/java/jdk/7u55-b13/jdk-7u55-linux-x64.tar.gz`
  - `tar xzf jdk-7u55-linux-x64.gz`
  - Have the JDK installed under :  
*`/home/ec2-user/jdk-7u55`*
- See : <http://tecadmin.net/steps-to-install-java-on-centos-5-6-or-rhel-5-6>

# Download and Install XAP 10

- **wget**  
**`http://www.gigaspaces.com/download_files/10/ga/gigaspaces-xap-premium-10.0.0XXX.zip`**
- **unzip gigaspaces-xap-premium-10.0.0XXX.zip**
- **Change the `/home/ec2-user/gigaspaces-xap-premium-10.0.0XXX/bin/setenv.sh` to include:**  
*`export JAVA_HOME=/home/ec2-user/jdk-7u55`*

# Download and Install XAP 10 BlobStore RPM

```
# wget
```

```
http://www.gigaspaces.com/download\_files/10/ga/blobstore-10.0.0XXX.noarch.rpm
```

```
# sudo XAP_HOME=/home/ec2-user/gigaspaces-xap-premium-10.0.0XXX sh -c "rpm -ivh blobstore-10.0.0XXX.noarch.rpm"
```

```
Preparing... ##### [100%]
```

```
1:blobstore ##### [100%]
```

# Getting the Device List – Low End SSD

# fdisk -l

Disk /dev/xvda1: 10.7 GB, 10737418240 bytes  
255 heads, 63 sectors/track, 1305 cylinders  
Units = cylinders of 16065 \* 512 = 8225280 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk identifier: 0x00000000

This is the OS drives.  
Please **DO NOT** use it  
with the blobstore  
configuration

Disk /dev/xvdb: 40.3 GB, 40256929792 bytes  
255 heads, 63 sectors/track, 4894 cylinders  
Units = cylinders of 16065 \* 512 = 8225280 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk identifier: 0x00000000

This is the **device you  
should use** with the  
blobstore configuration

# Getting the Device List – High End SSD

```
sudo -s
# fdisk -l
```

```
Disk /dev/xvda: 10.7 GB, 10737418240 bytes
97 heads, 17 sectors/track, 12717 cylinders
Units = cylinders of 1649 * 512 = 844288 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x0003b587
```

Device	Boot	Start	End	Blocks	Id	System
/dev/xvda1	*	2	7632	6291456	83	Linux

```
Disk /dev/xvdb: 800.2 GB, 800165027840 bytes
255 heads, 63 sectors/track, 97281 cylinders
Units = cylinders of 16065 * 512 = 8225280 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk identifier: 0x00000000
```

```
Disk /dev/xvdc: 800.2 GB, 800165027840 bytes
```

```
...
```

```
Disk /dev/xvdd: 800.2 GB, 800165027840 bytes
```

```
....
```

```
Disk /dev/xvde: 800.2 GB, 800165027840 bytes
```

```
...
```

```
Disk /dev/xvdf: 800.2 GB, 800165027840 bytes
```

```
...
```

```
Disk /dev/xvdg: 800.2 GB, 800165027840 bytes
```

```
...
```

```
Disk /dev/xvdh: 800.2 GB, 800165027840 bytes
```

```
...
```

```
Disk /dev/xvdi: 800.2 GB, 800165027840 bytes
```

```
...
```

These are the OS drives. Please **DO NOT** use these with the blobstore configuration

These are the available **devices when adding storage instance. These should be used** with the blobstore configuration

# The Blobstore PU

- XAP 10 Blobstore RPM comes with a blobstore PU template.
- You will find it at:  
*/home/ec2-user/gigaspaces-xap-premium-10.0.0XXX/deploy/templates/blobstoreDataGrid* folder
- Copy this folder into */home/ec2-user/gigaspaces-xap-premium-10.0.0XXX/deploy/SSD-DataGrid* to customize it.

# The SSD-DataGrid pu.xml

Edit the `\home\ec2-user\gigaspace-xap-premium-10.0.0XXX\deploy\SSD-DataGrid\META-INF\spring\pu.xml` to include the device list:

```
<blob-store:sandisk-blob-store id="sandiskBlobStore"
    blob-store-capacity-GB="100"
    blob-store-cache-size-MB="100"
    devices="/dev/xvdb,/dev/xvdc,/dev/xvdd,/dev/xvde,
/dev/xvdf,/dev/xvdg, /dev/xvdh,/dev/xvdi"
    volume-dir="/tmp/blobstore/data${clusterInfo.runningNumber}"
    durability-level="SW_CRASH_SAFE">
</blob-store:sandisk-blob-store>
```

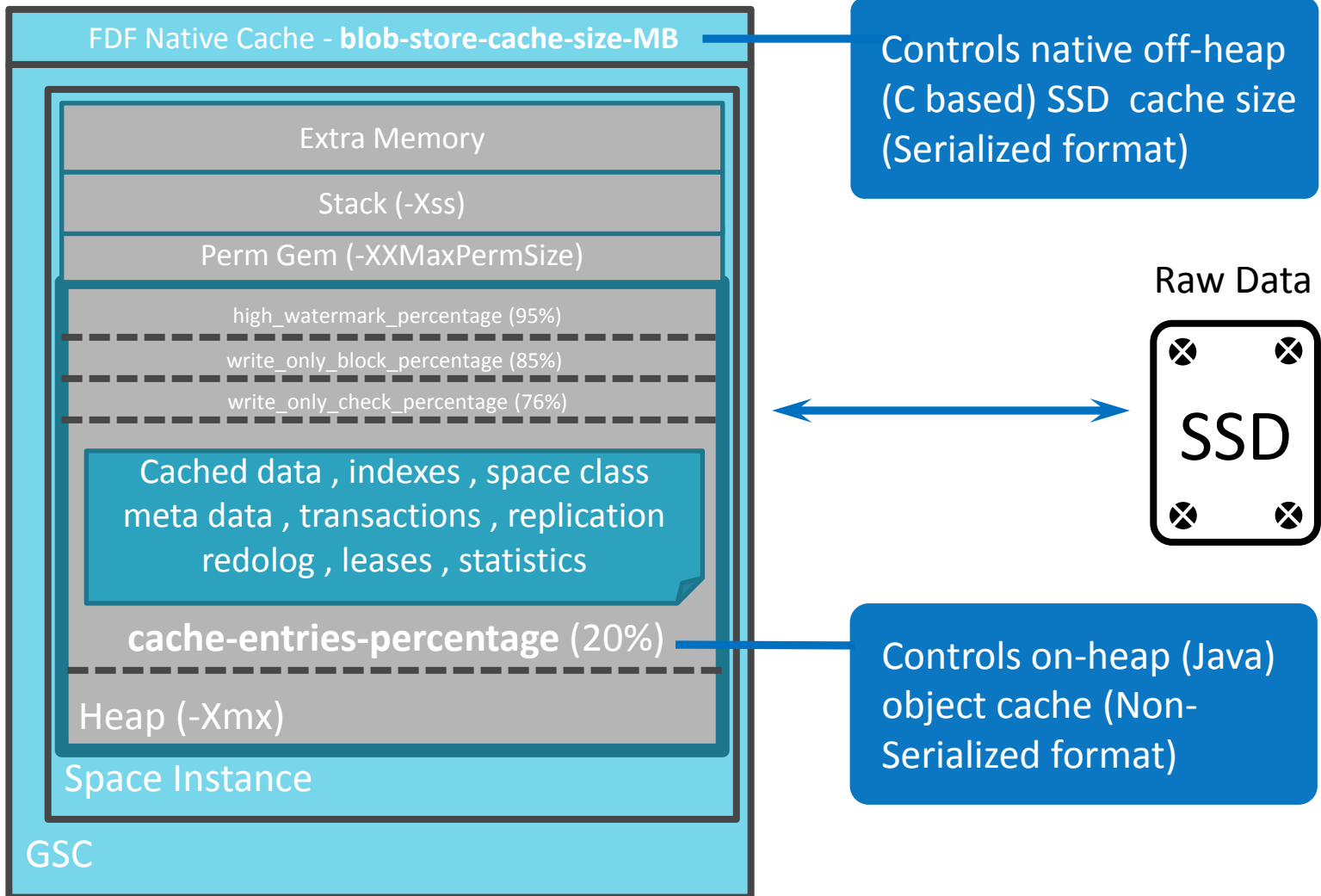
The device instance drives

```
<os-core:space id="space" url="/./SSD-DataGrid" >
  <os-core:blob-store-data-policy
    blob-store-handler="sandiskBlobStore"
    cache-entries-percentage="1"
    avg-object-size-KB="10"
    recover-from-blob-store="false"/>
</os-core:space>
```

We will allocate **1%** for on-heap cache

We will use 10K objects with our benchmarks

# BlobStore Main Configuration





# Start GigaSpaces blobstore agent and Web UI server

- `cd /home/ec2-user/gigaspace-xap-premium-10.0.xxx/bin`
- Edit the `gs-agent-blobstore.sh` and set the GSC heap size:  
`GSC_JAVA_OPTIONS="-Xmx30g -Xms30g -Dcom.gigaspace.grid.gsc.serviceLimit=1"; export GSC_JAVA_OPTIONS`
- Start the `blobstore` agent with 2 GSCs:  
`./gs-agent-blobstore.sh gsa.gsc 2 &`

Start the Web UI server:

`./gs-webui.sh &`

# Login to XAP Web-Console

Public-Instance-IP:8099

 **GIGASPACE** **XAP**

**Welcome**  
Please Log in

You may enter a locator or a group name to change the default cluster discovery policy

Username

Password

Groups

Locators

**LOGIN**

Start your browser and point it to:  
**Public-Instance-IP:8099**

Hit the **Login** button to access the XAP dashboard.

If you have a problem, you might not have set the right security group correctly

# Deploy RAM and SSD Data Grid via CLI

- *> cd /home/ec2-user/gigaspace-xap-premium-10.0.0XXX/bin*
- **> gs.sh deploy-space RAM-DataGrid**
- **> gs.sh deploy SSD-DataGrid**

# Check the symlink created

Once deployed - each blobstore data grid instance will have a symlink created mapped to available drive:

```
[root@zeppo bin]# ls /tmp/blobstore/data0 -il
total 0
135048 lrwxrwxrwx. 1 root root 9 Aug  1 08:58 SSD-
DataGrid_container-SSD-DataGrid -> /dev/xvdb
```

# Run Tests – The benchmark application

- Access the benchmark application

***cd /home/ec2-user/gigaspace-xap-premium-10.0.0XXX/tools/benchmark/bin***

- Create 4 copies of runTest.sh:

*> cp runTest.sh runSSD-DataGridWrite.sh*

*> cp runTest.sh runSSD-DataGridRead.sh*

*> cp runTest.sh runRAM-DataGridWrite.sh*

*> cp runTest.sh runRAM-DataGridRead.sh*

# Write Benchmark Command

- Modify the **runSSD-DataGridWrite.sh** to have:

```
Java com.....BenchmarkTest "jini://localhost/*/SSD-DataGrid" -execute first -s 10000 -showrate 50000 -tr 10 -i 200000 $*
```

- Modify the **runRAM-DataGridWrite.sh** to have

```
Java com.....BenchmarkTest "jini://localhost/*/RAM-DataGrid" -execute first -s 10000 -showrate 50000 -tr 10 -i 200000 $*
```

# Read Benchmark Command

- **Modify the runSSD-DataGridRead.sh to have:**

```
Java com.....BenchmarkTest "jini://localhost/*/SSD-DataGrid" -execute second -s 10000 -showrate 50000 -tr 10 -i 200000 $*
```

- **Modify the runRAM-DataGridRead.sh to have**

```
Java com.....BenchmarkTest  
"jini://localhost/*/RAM-DataGrid" -execute second  
-s 10000 -showrate 50000 -tr 10 -i 200000 $*
```

# Run the Write Benchmark

```
>./runSSD-DataGridWrite.sh
```

```
main - This Test will perform WRITE
```

```
main - MASTER SPACE URL: jini://localhost/*/SSD-DataGrid
```

```
...
```

```
main - ----- WRITE SUMMARY -----
```

```
main - WRITE AVG TEST TIME for all threads = 116381.100 ms
```

```
main - WRITE AVG TP for all threads = 1718.493 msg/sec
```

```
main - WRITE TOTAL TP for all threads = 17184.928 msg/sec , 163.888 MB/sec
```

```
>./runRAM-DataGridWrite.sh
```

```
main - This Test will perform WRITE
```

```
main - MASTER SPACE URL: jini://localhost/*/RAM-DataGrid
```

```
...
```

```
main - ----- WRITE SUMMARY -----
```

```
main - WRITE AVG TEST TIME for all threads = 91759.000 ms
```

```
main - WRITE AVG TP for all threads = 2179.627 msg/sec
```

```
main - WRITE TOTAL TP for all threads = 21796.270 msg/sec , 207.865 MB/sec
```



# Compare RAM Data Grid to SSD DataGrid





Lookup group(s): gigaspaces-10.0.0-XAPPremium-rc Logged in as: anonymous

Dashboard | Applications | Hosts | **Data Grids**

Your Premium license will expire in 52 days, [click here](#) to learn about our licensing options

Select Application: Unassigned Services

Space	Processing Unit	Actual Instances	SLA	Total Memory (MB)	Entries	Notify Templates	Connections	Active
SSD-DataGrid	SSD-DataGrid	1	1,0	 2651 (8.7%)	2000000	0	2	0
RAM-DataGrid	RAM-DataGrid	1	1,0	 20495 (66.9%)	2000000	0	3	0

Both data grids store the same amount of data, but the SSD-DataGrid consumes less RAM (2.6GB vs 20 GB).

Configuration

Queries

Types

Statistics

Gateways

Cl

## General

Space Schema	default
Secured	No
Persistent	No
Clustered	No
Cluster Sche...	n/a

## Memory Management

Cache Policy	Blob Store
LRU Eviction Batch Size	n/a
Cache Size	n/a
Memory Management State	Enabled
High Watermark	95%
Low Watermark	75%
Write Operation Rejection	85%
Write Operation Inspection	76%

## Network & Environment

Home Directory	n/a
Host Name	n/a
RMI Registry P...	n/a
JMX service URL	n/a

Capacity	100GB
Cache Capacity	100MB
Cache Size	31352
Volume Directory	n/a
Durability Level	SW_CRASH_SAFE
Recover from Blob...	No

# Run the Read Benchmark

```
>./runSSD-DataGridRead.sh
```

```
main - This Test will perform  READ
```

```
main - MASTER SPACE URL: jini://localhost/*/SSD-DataGrid
```

```
...
```

```
main - ----- READ SUMMARY -----
```

```
main - READ  AVG  TEST TIME  for all threads = 194574.500 ms
```

```
main - READ  AVG  TP for all threads = 1027.884 msg/sec
```

```
main - READ  TOTAL TP for all threads = 10278.843 msg/sec , 98.027 MB/sec
```

```
>./runRAM-DataGridRead.sh
```

```
main - This Test will perform  READ
```

```
main - MASTER SPACE URL: jini://localhost/*/RAM-DataGrid
```

```
...
```

```
main - ----- READ SUMMARY -----
```

```
main - READ  AVG  TEST TIME  for all threads = 85467.700 ms
```

```
main - READ  AVG  TP for all threads = 2340.074 msg/sec
```

```
main - READ  TOTAL TP for all threads = 23400.741 msg/sec , 223.167 MB/sec
```

# Benchmark options

- **For all benchmark options:**

- > runTest.sh -h

- **Popular options:**

- |  |   |
|--|---|
| -i [number of iterations]                        | number of iterations; default is 1000           |
| -tr [number of threads]<br>operation             | number of threads performing each<br>operation  |
| -s   | payload size in bytes                           |
| -execute first second<br>(without removing data) | (instead of -all) – will perform write and read |
| - clean  | clear data before running benchmark             |

# Automatic Data Recovery from SSD

# Automatic Data Recovery and Re-Indexing

- You may un-deploy the data grid , deploy and reload Indexes by enabling *recover-from-blob-store property*.
- You should construct sla.xml that lists the machines running SSD and the data grid nodes.
- With 8 cores server running 4 partitions with four drives , 100,000 items / second (1K payload) may be scanned and indexed.

# Enabling Data Recovery and Re-Indexing

Modify the SSD-Data-Grid pu.xml to enable the recover-from-blob-store:

```
<os-core:space id="space" url="/./SSD-DataGrid" >  
  <os-core:blob-store-data-policy  
    blob-store-handler="sandiskBlobStore"  
    cache-entries-percentage="1"  
    avg-object-size-KB="10"  
    recover-from-blob-store="true"/>  
</os-core:space>
```

# Create sla.xml

- The sla.xml should list all instances you have and their host.
- If you are running your tests with a single instance simply specify the same host for all instances.

# Partitioned data grid sla.xml

```
<os-sla:sla>
```

```
  <os-sla:instance-SLAs>
```

```
    <os-sla:instance-SLA instance-id="1">
```

```
      <os-sla:requirements>
```

```
        <os-sla:host ip="HostIP"/>
```

```
      </os-sla:requirements>
```

```
    </os-sla:instance-SLA>
```

```
  ...
```

```
    <os-sla:instance-SLA instance-id="4">
```

```
      <os-sla:requirements>
```

```
        <os-sla:host ip="HostIP"/>
```

```
      </os-sla:requirements>
```

```
    </os-sla:instance-SLA>
```

```
  </os-sla:instance-SLAs>
```

```
</os-sla:sla>
```

Place the Instance IP



# Lets test data reload and ReIndexing

- Undeploy the existing SSD-DataGrid
- Deploy the SSD-DataGrid using the sla.xml
- Write some data via the benchmark  
`runSSD-DataGridWrite.sh`
- See the object count, check footprint
- Undeploy and terminate the agent
- Start the agent , Deploy the SSD-DataGrid
- Monitor the data reload process

# BlobStore Available Statistics

- Counts of FDF access types
- Counts of various flash activities
- Histogram of key sizes
- Histogram of data sizes in bytes
- Histogram of access latencies in microseconds
- Number of events , Minimum , Maximum , Average , Geometric mean , Standard deviation
- Overwrite/Write---Through Statistics
- Total number of created objects
- Number of get/put/delete operations
- Number of hash/flash/invalid evictions
- Number of objects in flash
- Number of soft/hard overflows in hast table
- Number of pending IO's
- Flash space allocated/consumed in bytes
- Number of overwrites
- Number of hash collisions for get/set operations

# Useful SSD activity monitoring tool - iostat

[http://linuxcommand.org/man\\_pages/iostat1.html](http://linuxcommand.org/man_pages/iostat1.html)

## EXAMPLES

`iostat`

Display a single history since boot report for all CPU and Devices.

`iostat -d 2`

Display a continuous device report at two second intervals.

`iostat -d 2 6`

Display six reports at two second intervals for all devices.

`iostat -x hda hdb 2 6`

Display six reports of extended statistics at two second intervals for devices hda and hdb.

`iostat -p sda 2 6`

Display six reports at two second intervals for device sda and all its partitions (sda1, etc.)



# Thank You

