IBM Spectrum LSF

What's New in LSF Service Pack 12

Bill.McMillan@uk.ibm.com
Principal Product Manager
Spectrum Computing

Yun Gao
Technical Support Professional
Spectrum Computing

Mingliang Zu
Technical Account Manager
Spectrum Computing

Yi Sun
Technical Account Manager
Spectrum Computing

Michael Spriggs
STSM Spectrum Computing
Spectrum Computing

Upcoming Seminars

Details and Registration on www.ibm.biz/LSFCommunitySeminars

September 2, 2021
What's New in LSF Service Pack 12
Speaker: LSF Support Team

September 16, 2021
Best Practices for Upgrading your LSF Clusters
Speaker: Larry Adams, Expert Labs

September 30, 2021
What if....? Using the LSF Simulator to answer those hard questions
Speakers: John Welch & Renita Leung, LSF SME

October. Date to be confirmed.
The LSF.Next Beta Program
Speaker: Bill McMillan, Product Management

October 14, 2021
Simplifying HPC – Just push the button! Tips & Tricks
Speaker: Gabor Samu, Product Management

October 25-28, 2021
IBM TechU: https://www.ibm.com/training/events

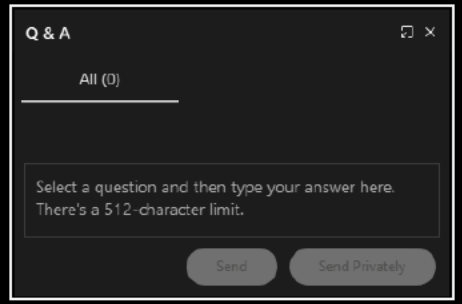
- Applied AI and HPC: Case Studies from IBM
- Deploying LSF with OCP: Tips and Tricks
- HPC Cloud Bursting on IBM Cloud: Tips and Tricks

November 11, 2021
Expediting PMR's with the LSF Support Tools
Speaker: LSF Support Team

November 29, 2021
High Performance Computing - Health Check Services from Lab Services
Speakers(s): Larry Adams, Expert Labs

Agenda

- Security Enforcement in FP12
- Nvidia A100 MIG Support in FP12
- Resource Connector Enhancement for Google Cloud
- Quick Deployment of LSF on IBM Cloud
- Deprecated Features
- Q&A: You can ask questions at any time in the Q&A panel



Security Enforcement in FP12

Security Enforcement in FP12

- A Brief Review of Major Security Features Introduced Prior to FP12
- New Parameters
- New Command Option
- New Enforced Default Value to The Security Related Parameters
- Compatibility

A Brief Review of Major Security Features Introduced Prior to FP12

- eauth.cve added (site-specific default encryption key and time difference check) in FP2
  - User customized eauth encryption key (LSF_EAUTH_KEY)
- eauth.cve upgrading in FP7
  - New parameter LSF_EXT_SERVERDIR in lsf.conf
  - New parameter LSF_ENV_OVERRIDE in lsf.conf
  - New hostsetup script options (--ext-serverdir --eauth-key)
- eauth.cve replaces the default eauth in FP10

A Brief Review of Major Security Features Introduced Prior to FP12

- Root privilege disabled by default in FP10
  - LSF_ROOT_REX removed in lsf.conf
  - New parameter LSF_ROOT_USER in lsf.conf
- Authentication of query commands (LSF_AUTH_QUERY_COMMANDS) in FP11
- Secured authorization requests (LSF_STRICT_CHECKING=enhanced) in FP11

New Parameters

- LSF_EAUTH_OLDKEY (lsf.sudoers)

  Specifies the previous key that eauth used to encrypt and decrypt user authentication data after you specify a new eauth key

- LSF_EAUTH_OLDKEY_EXPIRY (lsf.sudoers)

  Specifies the expiry date for the previous eauth key (LSF_EAUTH_OLDKEY_EXPIRY parameter), after which the previous key no longer works and only the new LSF_EAUTH_KEY parameter works.

New Command Option

- badmin security view

No	Category	Comment
1	Authentication	Check eauth version, LSF_EAUTH_KEY, LSF_EAUTH_OLDKEY_EXPIRY
2	Message Integrity	Check LSF_STRIC_CHEKCING
3	Secure Startup	Check LSF_STARTUP_USERS, set-user-id of bctrld, lsadmin, badmin
4	Secure Configuration	Check /etc/lsf.conf
5	Disallow Root User	Check LSF_ROOT_USER
6	Kerberos Impersonation	Check LSF_KRB_IMPERSONATE
7	Interactive Preload Protection	Check LSF_LD_SECURITY
8	Custom Plugin Location	Check LSF_EXT_SERVERDIR
9	Query Authentication	Check LSF_AUTH_QUERY_COMMANDS

New Command Option

- badmin security view

```
 yxu@ib20b01-401: badmin security view
Authentication                          Medium
Enhanced Message Integrity              Enabled
Secure Startup                          Enabled for USERLIST
Secure Configuration                    Disabled
Disallow Root User                      Enabled
Interactive Preload Protection          Disabled
Custom Plugin Location                  Disabled
Query Authentication                    Enabled
```

```
 yxu@ib20b01-684: badmin security view -v
Authentication                          Medium
You are using an up-to-date version of eauth with an automatically generated
encryption key.

Enhanced Message Integrity              Enabled
The default value of LSF_STRICT_CHECKING=ENHANCED is set, ensuring that
communications cannot be tampered with.

Secure Startup                          Disabled
It is strongly recommended to remove the setuid bit from lsadmin, badmin,
bctrld and eauth. Daemon startup/shutdown should be performed with "bctrld"
and setuid should only be set on bctrld and eauth when LSF_STARTUP_USERS is
defined in lsf.sudoers.

Secure Configuration                    Enabled
Secure configuration is enabled and cluster configuration will always be read
from /etc/lsf.conf and $LSF_ENVDIR will be ignored.

Disallow Root User                      Enabled
The root user is not allowed to perform actions as a valid user from the
LSF command line.

Interactive Preload Protection          Disabled
Preload libraries are allowed when running interactive workload. This may
weaken security and is not recommended.

Custom Plugin Location                  Disabled
Your e*plugins (eauth/elim etc) are stored in $LSF_SERVERDIR. This means they
could be accidentally overridden during upgrades.

Query Authentication                    Enabled
Authentication is enabled for LSF query commands.
```

New Enforced Default Value to the Security Related Parameters

Parameters	Prior FP12	FP12
LSF_STRICT_CHECKING	Not defined	ENHANCED
LSF_AUTH_QUERY_COMMANDS	N	Y
LSF_ENV_OVERRIDE	Y	N

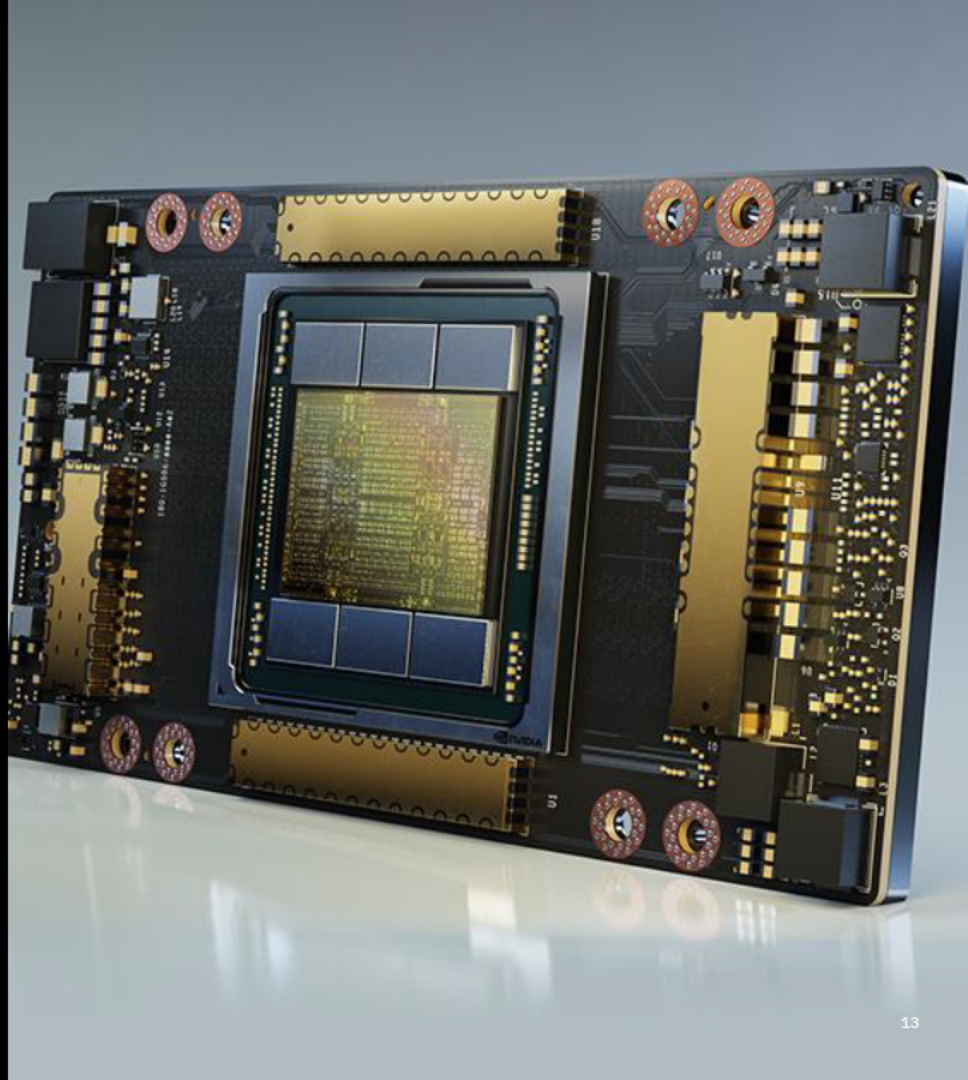
Compatibility

LS, DM, PPM, RTM, MC PAC, Explore / LSF	[Prior FP2)	[FP2 ~ FP11]	FP12
[10.1 GA ~ FP2)	√	×	×
[FP2 ~ FP11]	×	√	×
FP12	×	Condition	√

- Condition

1. If LSF_STRICT_CHECKING is not defined in lsf.conf, "N" should be configured to resolve the compatibility issue.
2. If LSF_AUTH_QUERY_COMMANDS is not defined in lsf.conf, "N" should be configured to resolve the compatibility issue.
3. If above 2 parameters are defined in lsf.conf, everything should be working fine.

Nvidia A100 MIG Support in FP12

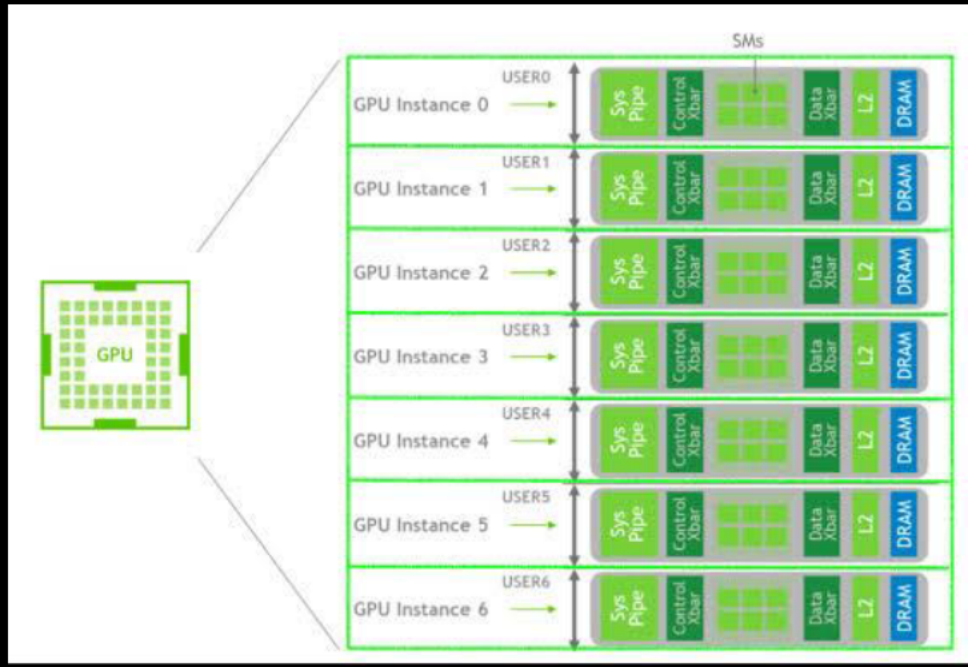


Nvidia A100 MIG Support in FP12

- MIG Introduction
- LSF MIG Support Pre-request
- LSF New Parameters for MIG Support
- New command options for MIG Support
- Use Case of MIG Support

MIG introduction

- NVIDIA releases GPU A100 with Multi-Instance GPU (MIG)feature.



MIG introduction

- GPU Instances (GI)
  - Each GPU can be splited to 7 GPU instances(GI) at most.
  - The name of GI indicates the GPU Slices number and GPU memory
    "2g.10gb" means the GI have 2 GPU Slices and 10GB GPU memory.

GPU Instance (GI) Profiles			
Profile Name	Fraction of Memory	Fraction of SMs	Number of Instances Available
MIG 1g.5gb	1/8	1/7	7
MIG 2g.10gb	2/8	2/7	3
MIG 3g.20gb	4/8	3/7	2
MIG 4g.20gb	4/8	4/7	1
MIG 7g.40gb	Full	7/7	1

MIG introduction

- Compute Instances (CI)
  - Each GPU instance (GI) can be divided to several GPU Compute Instances(CI)

Memory	20gb			20gb	
GPU Instance	3g			3g	
Compute Instance	1c	1c	1c	2c	1c
MIG Device	1c.3g.20gb	1c.3g.20gb	1c.3g.20gb	2c.3g.20gb	1c.3g.20gb
	GPC	GPC	GPC	GPCGPC	GPC

The above shows that two different "3g.20gb"GPU Instances (GI) can be divided to 3 Compute Instances (CI) named 1c/1c/1c and 2 Compute Instances (CI)named 2c/1c respectively.

MIG introduction

- MIG Device
  - A CI and its parent GI can be called a MIG device. And CUDA applications treat the MIG device as a normal GPU.

    For example,
    - A MIG device called 3g.20gb means the device have 3 GPU slices and 20 GB GPU memory, all compute instance are used.

    - A MIG device called 2c.3g.20gb means the device have 3 GPU SM slices and 20 GB GPU memory, and only 2 compute instances(GPU SM slices) of total 3 are used.

LSF MIG Support Pre-request

- Enable Nvidia MIG mode

```
$ sudo nvidia-smi -i 0 -mig 1
Enabled MIG Mode for GPU 00000000:36:00.0
All done.
```

- LSF GPU related parameters setting

  LSF_GPU_RESOURCE_IGNORE=Y
  LSF_GPU_AUTOCONFIG=Y
  LSB_GPU_NEW_SYNTAX=extend
  LSF_MANAGE_MIG=Y/N

LSF New Parameters for MIG Support

- LSF_MANAGE_MIG=N (Default Value)

  The GPU instance(GI) and Compute instance(CI) is configured by the administrator on each hosts. LSF dispatches the job to the host based on its GI/CI topology.

  For example:

  The administrator creates GI/CI with size 1c.3g.20gb, 2c.3g.20gb, and 3g.20gb on host1, and the user submit a job with '-gpu num=1:mig=3/2' request. LSF searches the available MIG resource among the hosts in the cluster, allocate the MIG resource and dispatch the job to host1, run the job on the MIG device 2c.3g.20gb

LSF New Parameters for MIG Support

- LSF_MANAGE_MIG=Y

  LSF dynamically manages the GI/CI allocation/deallocation for the GPU hosts in the cluster. LSF will create GI/CI according to the job's requirement and destroy GI/CI after job execution finishes.

  For example:

  The administrator doesn't need to configure any GI/CI on GPU hosts in advance. If the user requests a job 'mig=3/2', LSF allocates a host that MIG 3/2 can be created, dispatch the job to that host, create GI/CI for this job, run job on the MIG device, finally destroy the MIG device.

New command option for MIG Support

- **lshosts –mig**
  - Use '*lshosts –gpu –mig*' to check the MIG instances on each GPU hosts.
  - '*lshosts –gpu*' indicate which gpu enabled MIG mode on each hosts

```
rladmin@rl-dgxa-c18-u19:~/migtest/lsftop/conf$ lshosts -gpu -mig
HOST_NAME   gpu_id       gpu_model   gpu_driver   gpu_factor      numa_id       vendor        devid          gid          cid      inst_name
rl-dgxa-c18      0 TeslaA100_SXM4_    450.51.06          8.0            3       Nvidia            0           11            0         1g.5gb
                 0 TeslaA100_SXM4_    450.51.06          8.0            3       Nvidia            1           13            0         1g.5gb
                 1 TeslaA100_SXM4_    450.51.06          8.0            3       Nvidia            0            3            0        2g.10gb
                 2 TeslaA100_SXM4_    450.51.06          8.0            1       Nvidia            0            2            0        3g.20gb
                 3 TeslaA100_SXM4_    450.51.06          8.0            1       Nvidia            0            1            0        4g.20gb
                 4 TeslaA100_SXM4_    450.51.06          8.0            7       Nvidia            0            0            0        7g.40gb
                 5 TeslaA100_SXM4_    450.51.06          8.0            7       Nvidia            -            -            -              -
                 6 TeslaA100_SXM4_    450.51.06          8.0            5       Nvidia            -            -            -              -
                 7 TeslaA100_SXM4_    450.51.06          8.0            5       Nvidia            -            -            -              -
rladmin@rl-dgxa-c18-u19:~/migtest/lsftop/conf$ lshosts -gpu
HOST_NAME   gpu_id       gpu_model   gpu_driver   gpu_factor      numa_id       vendor          mig
rl-dgxa-c18      0 TeslaA100_SXM4_    450.51.06          8.0            3       Nvidia            Y
                 1 TeslaA100_SXM4_    450.51.06          8.0            3       Nvidia            Y
                 2 TeslaA100_SXM4_    450.51.06          8.0            1       Nvidia            Y
                 3 TeslaA100_SXM4_    450.51.06          8.0            1       Nvidia            Y
                 4 TeslaA100_SXM4_    450.51.06          8.0            7       Nvidia            Y
                 5 TeslaA100_SXM4_    450.51.06          8.0            7       Nvidia            Y
                 6 TeslaA100_SXM4_    450.51.06          8.0            5       Nvidia            Y
                 7 TeslaA100_SXM4_    450.51.06          8.0            5       Nvidia            Y
```

Use Case of MIG Support

- Use '*mig=gi_size/ci_size*' in job submission to request a MIG device
- Use '*bjobs -gpu*' shows the GPU_ALLOCATION with MIG info

```
rladmin@rl-dgxa-c18-u19:~/migtest/lsftop/conf$ bsub -gpu num=1:mig=1/1 ../../mig_bin/e06-gpu
Job <416> is submitted to default queue <normal>.
rladmin@rl-dgxa-c18-u19:~/migtest/lsftop/conf$ bjobs
JOBID   USER    STAT  QUEUE      FROM_HOST   EXEC_HOST   JOB_NAME   SUBMIT_TIME
416     rladmin RUN   normal     rl-dgxa-c18 rl-dgxa-c18 *n/e06-gpu Nov 25 06:19
rladmin@rl-dgxa-c18-u19:~/migtest/lsftop/conf$ bjobs -l -gpu

Job <416>, User <rladmin>, Project <default>, Status <RUN>, Queue <normal>, Com
                     mand <../../mig_bin/e06-gpu>, Share group charged </rladmi
                     n>
Wed Nov 25 06:19:01: Submitted from host <rl-dgxa-c18-u19-enp226s0>, CWD <$HOME
                     /migtest/lsftop/conf>, Requested GPU <num=1:mig=1/1>;
Wed Nov 25 06:19:01: Started 1 Task(s) on Host(s) <rl-dgxa-c18-u19-enp226s0>, A
                     llocated 1 Slot(s) on Host(s) <rl-dgxa-c18-u19-enp226s0>,
                     Execution Home </home/rladmin>, Execution CWD </home/rladm
                     in/migtest/lsftop/conf>;

 SCHEDULING PARAMETERS:
           r15s   r1m  r15m   ut      pg    io   ls    it    tmp    swp    mem
 loadSched   -     -     -     -       -     -    -     -     -      -      -
 loadStop    -     -     -     -       -     -    -     -     -      -      -

 RESOURCE REQUIREMENT DETAILS:
 Combined: select[(ngpus>0) && (type == local)] order[r15s:pg] rusage[ngpus_phy
                     sical=1.00:mig=1/1]
 Effective: select[((ngpus>0)) && (type == local)] order[r15s:pg] rusage[ngpus_
                     physical=1.00:mig=1/1]

 GPU REQUIREMENT DETAILS:
 Combined: num=1:mode=shared:mps=no:j_exclusive=yes:gvendor=nvidia:mig=1/1
 Effective: num=1:mode=shared:mps=no:j_exclusive=yes:gvendor=nvidia:mig=1/1

 GPU_ALLOCATION:
 HOST              TASK GPU_ID  GI_ID/SIZE    CI_ID/SIZE    MODEL        MTOTAL  FACTOR MRSV    SOCKET NVLINK/XGMI
 rl-dgxa-c18-u19-  0    0       4/1           4/1           TeslaA100_SX 39.5G   8.0    0M      3      -
```

Use Case of MIG Support

- Use '*bhosts -gpu -l*' to shows the MIG info on each hosts.

```
rladmin@rl-dgxa-c18-u19:~/migtest/lsftop/conf$ bhosts -gpu -l

HOST: rl-dgxa-c18-u19-enp226s0
NGPUS NGPUS_SHARED_AVAIL NGPUS_EXCLUSIVE_AVAIL
8     8                  8

STATIC ATTRIBUTES
GPU_ID MODEL                 MTOTAL    FACTOR   SOCKET VENDOR   MIG    NVLINK/XGMI
0      TeslaA100_SXM4_40GB   39.5G     8.0      3      Nvidia   Y      -/N/N/N/N/N/N/N
1      TeslaA100_SXM4_40GB   39.5G     8.0      3      Nvidia   Y      N/-/N/N/N/N/N/N
2      TeslaA100_SXM4_40GB   39.5G     8.0      1      Nvidia   Y      N/N/-/N/N/N/N/N
3      TeslaA100_SXM4_40GB   39.5G     8.0      1      Nvidia   Y      N/N/N/-/N/N/N/N
4      TeslaA100_SXM4_40GB   39.5G     8.0      7      Nvidia   Y      N/N/N/N/-/N/N/N
5      TeslaA100_SXM4_40GB   39.5G     8.0      7      Nvidia   Y      N/N/N/N/N/-/N/N
6      TeslaA100_SXM4_40GB   39.5G     8.0      5      Nvidia   Y      N/N/N/N/N/N/-/N
7      TeslaA100_SXM4_40GB   39.5G     8.0      5      Nvidia   Y      N/N/N/N/N/N/N/-

DYNAMIC ATTRIBUTES
GPU_ID MODE                MUSED     MRSV      TEMP   ECC    UT     MUT    PSTATE STATUS   ERROR
0      SHARED              87M       0M        31C    0      0%     0%     0      ok       -
1      SHARED              7M        0M        27C    0      0%     0%     0      ok       -
2      SHARED              11M       0M        28C    0      0%     0%     0      ok       -
3      SHARED              14M       0M        28C    0      0%     0%     0      ok       -
4      SHARED              0M        0M        31C    0      0%     0%     0      ok       -
5      SHARED              0M        0M        30C    0      0%     0%     0      ok       -
6      SHARED              0M        0M        30C    0      0%     0%     0      ok       -
7      SHARED              0M        0M        30C    0      0%     0%     0      ok       -

GPU JOB INFORMATION
GPU_ID JEXCL  RUNJOBIDS          SUSPJOBIDS         RSVJOBIDS          GI_ID/SIZE   CI_ID/SIZE
0      Y      416                -                  -                  4/1          4/1
1      -      -                  -                  -                  -            -
2      -      -                  -                  -                  -            -
3      -      -                  -                  -                  -            -
4      -      -                  -                  -                  -            -
5      -      -                  -                  -                  -            -
6      -      -                  -                  -                  -            -
7      -      -                  -                  -                  -            -
```

Use Case of MIG Support

- Request MIG device with GPU memory.
  - *“bsub –gpu num=1:mig=3/2:gmem=5G gpu_app”*

    It will request 1 MIG device with GI size 5 CI size 2 and 5G memory on this GPU Instance(GI).

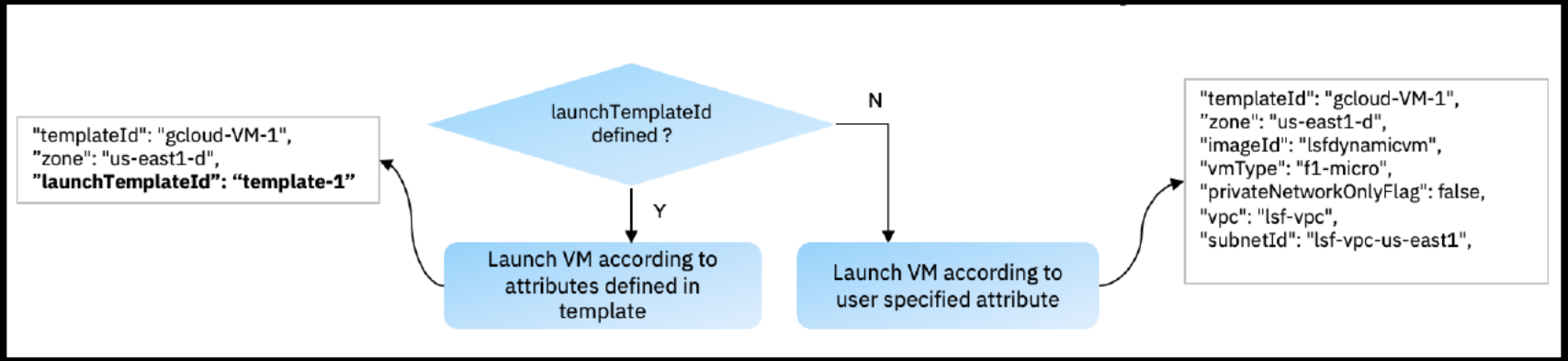
- Request share/exclusive MIG device.
  - *“bsub –gpu num=1:mig=2/1:mode=shared(or mode=exclusive_process or j_exclusive=yes) gpu_app”*

    Although in MIG mode, only shared mode are supported, LSF has been enhanced to use MIG device exclusively or shared.

Resource Connector Enhancement for Google Cloud

Launch Instance Template

- Instance template is created on Google Cloud Platform portal
- Use **launchTemplateId** in googleprov_templates.json to enable support of launch instance template
- Properties of the instance can be defined within the instance template
- Properties defined in googleprov_templates.json override instance template



Local SSDs

- Local SSDs are supported through instance template, not in googleprov_templates.json
- In Google Cloud, attach local SSDs to instance template in **Disks _> Add new disk**
- SSDs must be mounted before being used. LSF provides an example of how to mount them in user_data: **`<LSF_TOP>/<LSF_VERSION>/resource_connector/google/scripts/example_user_data.sh`**

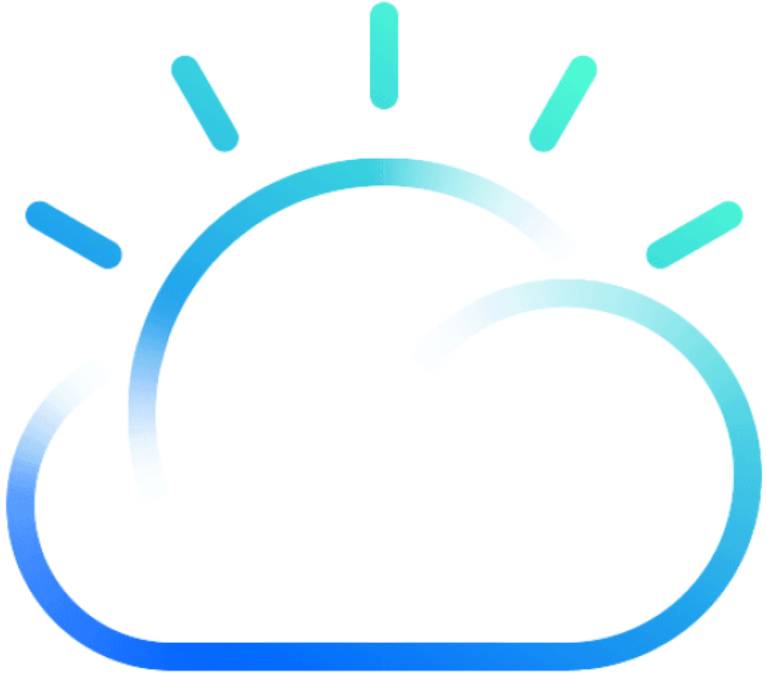
Preemptable VM instances

- Preemptable VM instances are supported through instance template, not in googleprov_templates.json
- In Google Cloud, set the **Preemptibility** field to **On** when creating the launch instance template to enable preemptible VM instances.
- When an instance is preempted, LSF automatically requeue the jobs running on it by default.
  - Using RC_RECLAIM_ACTION=REQUEUE | TERMINATE to change the default behavior

Bulk instance APIs (Bulk API endpoints)

- With bulk API, LSF resource connector creates VM instances and check status in batch
- Specify zone to let LSF call **zonal bulk API.** Instances launch in the specified zone
- Leave zone undefined to let LSF call **regional bulk API**. Zone of the instance is selected by Google Compute Engine based on hardware availability.
- Use **GCLOUD_REGION** in googleprov_config.json to define the region. Can be override by region in googleprov_template.json

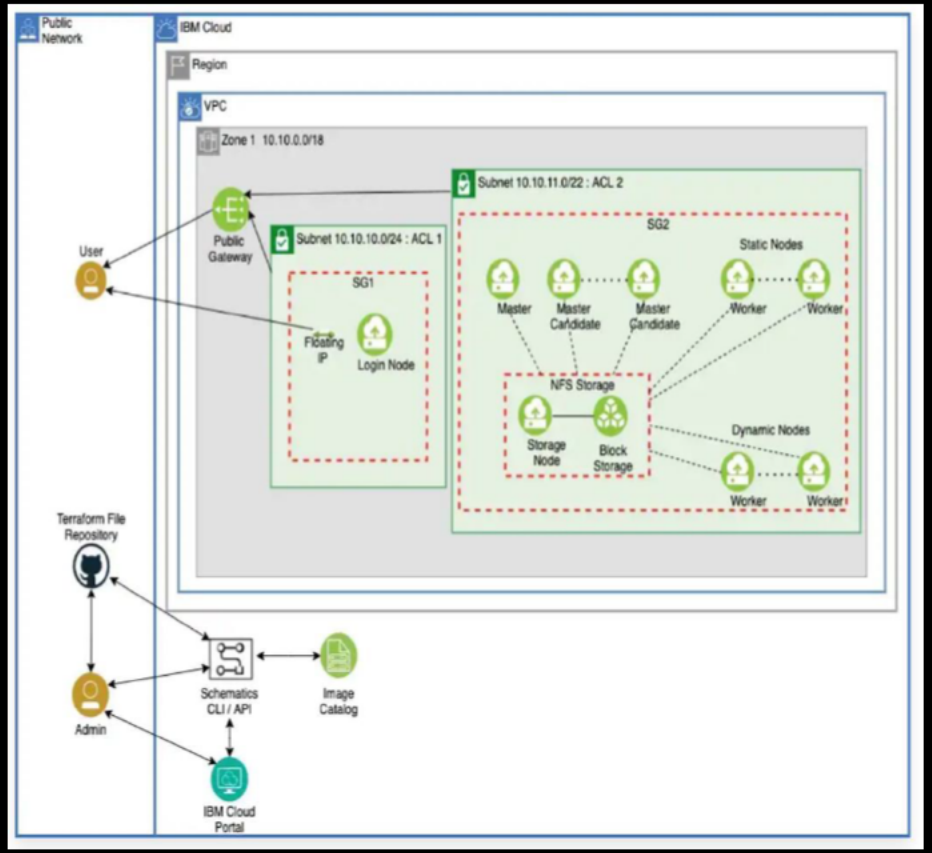
Quick Deployment of LSF on IBM Cloud

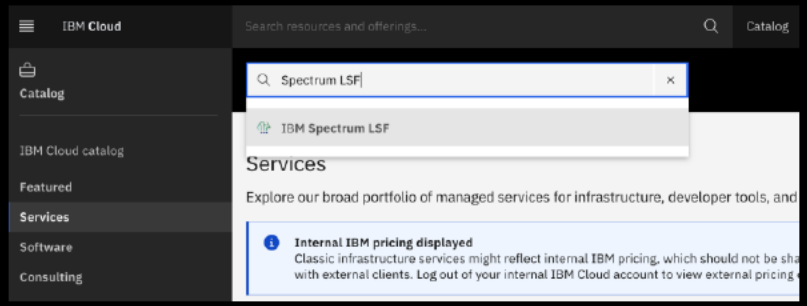


Quick Deployment of LSF on IBM Cloud

- Deploy LSF with Resource Connector on IBM Cloud with a few clicks
- Automated deployment for compute, network and storage resources
- Easy to auto-scale up and down based on demand
- Allows seamless bursting to IBM Cloud from on-premise clusters with LSF Multi-Cluster
- Transfer data between clusters intelligently with LSF Data Manager

Quick Deployment of LSF on IBM Cloud





Parameter	Description	Value
api_key	This is the API key for IBM Cloud account in which the Spectrum LSF cluster needs to be deployed. Learn more.	Enter api_key
ssh_key_name	Name of the SSH key configured in your IBM Cloud account that is used to establish a connection to the LSF master node. If you do not have an SSH key in your IBM Cloud account, create one by using the instructions given here.	Enter ssh_key_name
lsf_license_confirmation	Please confirm your use of IBM Spectrum LSF licenses. By entering 'true' for the property you have agreed to one of the two conditions. 1. You are using the software in production and confirm you have sufficient licenses to cover your use under the International Program License Agreement (IPLA). 2. You are evaluating the software and agree to abide by the International License Agreement for	Enter lsf_license_confirmation

Deprecated LSF Features in FP12

Deprecated LSF Features in FP12

Deprecated feature	Corresponding deprecated parameters and commands	Alternative feature

LSF multicluster capability resource leasing model	• `lsb.resources` file:
	  • **`HostExport`** section
	  • **`SharedResourceExport`** section
	• `lsb.queues` file:
	  • **`HOSTS`**: allremote and all@*`cluster_name`* keywords
		Updated LSF default behavior.

LSF/XL feature and LSF Advanced Edition.	• **`-cname`** option for the following commands: **`bacct`**, **`bhosts`**, **`bjobs`**, **`bmgroup`**, **`lshosts`**, **`lsload`**.	Updated LSF default behavior.

Deprecated LSF Features in FP12

Deprecated feature	Corresponding deprecated parameters and commands	Alternative feature

Job slot pools for fairshare scheduling	• lsb.queues file:
	  • **MAX_SLOTS_IN_POOL**
	  • **SLOT_POOL**
	  • **SLOT_SHARE**
	  • **USE_PRIORITY_IN_POOL**
		Guarantee SLA (guarantee service class).

toplib integrations	• lsf.conf file:
	  • **LSF_TOPD_PORT**
	  • **LSF_TOPD_TIMEOUT**	

Chunk job scheduling	• lsf.conf file:
	  • **LSB_CHUNK_RUSAGE**
	• lsb.params file:
	  • **CHUNK_JOB_DURATION**
	• lsb.applications and lsb.queues files:
	  • **CHUNK_JOB_SIZE**
		Use the RELAX_JOB_DISPATCH_ORDER parameter in the lsb.params file to enable multiple jobs with common resource requirements to run consecutively on the same allocation.

Deprecated LSF Features in FP12

Deprecated feature	Corresponding deprecated parameters and commands		Alternative feature

HPC integrations for the following environments:
 	
- Parallel job support using PAM
 	
- IBM Parallel Environment (IBM PE) (See Running MPI workload through IBM Parallel Environment Runtime Edition)
 	
- SGI CPUSET
	• lsf.conf file:
	  • **LSF_PAM_APPL_CHKPNT**
	  • **LSF_PAM_CLEAN_JOB_DELAY**
	  • **LSF_PAM_HOSTLIST_USE**
	  • **LSF_PAM_PLUGINDIR**
	  • **LSF_PAM_USE_ASH**
	  • **LSF_PE_NETWORK_NUM**
	  • **LSF_PE_NETWORK_UPDATE_INTERVAL**
	  • **LSB_CPUSET_BESTCPUS**
	  • **LSB_CPUSET_DISPLAY_CPULIST**
	  • **LSF_CPUSETLIB**
	
	• lsb.applications file:
	  • **NETWORK_REQ**
		• lsb.params file:
		  • **MAX_PROTOCOL_INSTANCES**
		  • **NETWORK_REQ**
		  • **STRIPING_WITH_MINIMUM_NETWORK**
		
		• lsb.queues file:
		  • **MAX_PROTOCOL_INSTANCES**
		  • **NETWORK_REQ**
		  • **STRIPING_WITH_MINIMUM_NETWORK**
		
		• bsub -network command option
			Use the blaunch command for parallel jobs.

Deprecated LSF Features in FP12

Deprecated feature	Corresponding deprecated parameters and commands	Alternative feature
Automatic CPU frequency selection in energy aware scheduling (See Automatic CPU frequency selection)		
Relaxed syntax for resource requirement selection strings	• lsf.conf file: • **LSF_STRICT_RESREQ: Now fixed to Y.**	Updated LSF default behavior (strict syntax for resource requirement selection strings).
Task list files and related commands	• lsf.task file • lsf.conf file: • **LSF_SHELL_AT_USERS** • ch command • lsfmon command • lslogin command • lsmon command • lstcsh command • lsltasks command • lsrtasks command • lseligible command	

LSF Features to Be Deprecated in the Next Release

Feature to be deprecated in the next LSF release	Corresponding deprecated parameters and commands	Alternative feature

SLA scheduling except guarantee SLA (See Using goal-oriented SLA scheduling).	• `lsb.params file:`
	  • **`ENABLE_DEFAULT_EGO_SLA`**
	• `lsb.serviceclasses file:`
	  • **`GOALS:`** `THROUGHPUT, VELOCITY, and DEADLINE keywords.`	

Slot and package guarantee policy	• `lsb.params file:` • **`SIMPLIFIED_GUARANTEES:`** `Will be fixed to Y.`	Guarantee SLA (guarantee service class), which will be the default behavior.

GPU scheduling and features that use ELIM	•`lsf.conf` file:
	  • **`LSB_GPU_NEW_SYNTAX`**: Will be fixed to extend.
	  • **`LSF_GPU_RESOURCE_IGNORE`**: Will be fixed to Y.
	  • **`LSF_GPU_AUTOCONFIG`**: Will be fixed to Y.
	•All **`elim.gpu.*`** ELIMS.:
		Updated LSF default behavior (GPU autoconfiguration).

References

Release Notes of FP12 -
https://www.ibm.com/docs/en/spectrum-lsf/10.1.0?topic=wn-whats-new-in-lsf-101-fix-pack-12

Download Link of FP12 -
http://www.ibm.com/support/fixcentral/swg/selectFixes?product=ibm/Other+software/IBM+Spectrum+LSF&release=All&platform=All&function=fixId&fixids=lsf-10.1.0.12-spk-2021-Jun-build600488&includeSupersedes=0

Detailed Deprecated Features in FP12 -
https://www.ibm.com/docs/en/spectrum-lsf/10.1.0?topic=12-deprecated-features

LSF Deployment on IBM Cloud -
https://cloud.ibm.com/docs/ibm-spectrum-lsf?topic=ibm-spectrum-lsf-about-spectrum-lsf

Nvidia A100 MIG user guide -
https://docs.nvidia.com/datacenter/tesla/mig-user-guide/index.html

Thank you

Yun Gao
LSF Support Professional
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bjyungao@cn.ibm.com