

Migration Guide: Amazon Aurora to MySQL HeatWave on Amazon Web Services (AWS)

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Purpose statement

This document provides an overview of the steps to migrate to MySQL HeatWave.

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What is MySQL HeatWave

MySQL HeatWave is a fully managed database service, powered by the integrated HeatWave in-memory query accelerator. It's the only cloud database service that combines transactions, analytics, and machine learning services into one MySQL Database, delivering real-time, secure analytics without the complexity, latency, and cost of extract, transform, and load (ETL) duplication. It's available on Oracle Cloud Infrastructure (OCI), Amazon Web Services (AWS), and Microsoft Azure.

MySQL HeatWave on AWS delivers price performance that is 7X better than Amazon Redshift and 10X better than Snowflake. On a <u>10 GB TPC-C workload</u>, MySQL HeatWave offers up to 10X higher and sustained throughput compared to Amazon Aurora at high concurrency. With MySQL HeatWave ML, developers and data analysts can build, train, deploy, and explain machine learning models in MySQL HeatWave without moving data to a separate machine learning service. For machine learning, MySQL HeatWave on AWS is 25X faster than Redshift ML.

Learn more about MySQL HeatWave

Before you start

- Using the method outlined in this migration guide, where you export your source database and then import it into MySQL HeatWave, there will be some downtime involved. The length of the downtime will mostly depend on the size of your database and checks you may want to perform before bringing your database back online.
- 2. You must have an account on Oracle Cloud Infrastructure (OCI) and be able to log in to it at https://cloud.oracle.com/
 - If you do not have an account on OCI, you can create one at <u>https://www.oracle.com/mysql/free/</u>
- 3. You must have enabled "MySQL HeatWave on AWS service" from the OCI Console.
 - For instructions on how to enable MySQL HeatWave on AWS from OCI, refer to the documentation https://dev.mysql.com/doc/heatwave-aws/en/heatwave-aws-sign-up.html

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I. Preparing your AWS environment

Section A: Prerequisites

- 1. To migrate using the method that is shown in this guide, you will need a source Amazon Aurora MySQL instance based on MySQL 5.7 or above. For this guide, we have chosen an Amazon Aurora MySQL 5.7.12.
 - When applicable, you should always execute the commands shown in this guide as a root/admin user.

You can view the Amazon Aurora MySQL version that is being used for this guide as shown in the image below:

My <mark>SQL</mark> database-1.0	.us-east-1.rds.amazonaws	SQL >	SELECT	@@VERSION;
++				
@@VERSION				
++				
5.7.12				
++				
1 row in set (0.0008 sec)				

You can check what version of MySQL you are using by logging into your Amazon Aurora MySQL Server and execute:

mysql> SELECT @@VERSION;

- 2. For this guide, we have some data pre-loaded on our Amazon Aurora MySQL database.
 - The sample data used in this guide is the 'world' database, which can be downloaded from here: https://dev.mysql.com/doc/index-other.html.

You can see a list of all the databases on your Amazon Aurora MySQL Server and the tables in the world database as shown below. We will export the world database from Amazon Aurora MySQL to MySQL HeatWave on AWS.

mysql> SHOW DATABASES; mysql> SHOW TABLES IN world;	
MySQL database-1.c	<pre>-east-1.rds world SQL > SHOW SCHEMAS;</pre>
++ Database +	
information_schema mysql performance_schema sys world ++ 5 rows in set (0.0018 sec)	
My <mark>SQL</mark> database-1.	<pre>-east-1.rds world SQL > SHOW TABLES IN world;</pre>
++ Tables_in_world ++	
city country countrylanguage +	

Section B: Create an EC2 Instance and configure your SSH keys

3. Login to your AWS account.

[Option+S]	と				
	Reset to default layout + Add widget				
e Home. naged instances, Ops summary, and Patch compliance wi	idgets. Find them at the bottom of your Console Home. $ imes$				
Recently visited Info					
중 S3	Getting started with AWS 🗹 Learn the fundamentals and find valuable				
Database Migration Service	information to get the most out of AWS.				
	Training and certification Z Learn from AWS experts and advance you				
	🛱 skills and knowledge.				
	What's new with AWS? Discover new AWS services, features, and Regions.				
	e Home. Inaged instances, Ops summary, and Patch compliance w S3 AWS Budgets Database Migration Service				

4. Click on the "Services" menu and go to "Compute" > "EC2"





5. On the "EC2 Dashboard" page, look for the "Launch instance" button.







6. Click "Launch instance". When the "Launch an instance" page opens, enter a name for your EC2 Instance. For this guide, we have chosen "MySQL-EC2"



7. For Amazon Machine Image type, choose "Red Hat" and either version "Linux 8 or 9". In the example below, we have selected Linux 9.

 Application 	and OS Im	ages (Amazo	on Machine	Image) Info		Summary
An AMI is a temp launch your insta	late that contains nce. Search or Bro	the software config wse for AMIs if you	guration (operatin don't see what ye	ig system, application s ou are looking for belo	erver, and applications) required to w	Number of instances Info
						1
Q Search ou	r full catalog in	cluding 1000s of	application and	d OS images		Software Image (AMI)
Description	Quick Street					Provided by Red Hat, Inc. ami-08e637cea2f053dfa
Recents	Quick Start					Virtual server type (instance type)
Amazon	macOf	Ubuntu	Mindows	Ped Hat 6	0	t2.micro
Linux	macOS	Obuntu	Windows	Red Hat 5	Q	Firewall (security group)
3///5				>	Browse more AMIs	New security group
uv s	Mac	ubuntu	Microsoft	Sed Hat	AWS, Marketplace and	Storage (volumes)
Amazon Machi	ne Image (AMI)				the Community	1 volume(s) - 10 GiB
Red Hat Ente	rprise Linux 9 (2f053dfa (64-bit	(x)) / ami-05c5c4	ne Type 74dfb6af922 (64	-bit (Arm))	Free tier eligible	Free tier: In your first year includes 750



8. For "Instance type", select one that suits your needs. Afterwards for the "Key pair" section, click on "Create new key pair". You can also use your existing keys here.

aws	Services Q Search	[Option+S]	24	¢° (0	N. Virginia 🔻
🙋 EC2	🔞 VPC 🐱 RDS 🗧 IAM 🗟 S3				
≡					
	▼ Instance type Info				
	Instance type				
	t2.micro Free tier elig Family: t2 1 vCPU 1 GIB Memory On-Demand Linux pricing: 0.0116 USD per Hou On-Demand Windows pricing: 0.0162 USD per Hour On-Demand Linux pricing: 0.0116 USD per Hour On-Demand Linux pricing: 0.0116 USD per Hour				
	▼ Key pair (login) Info				
	You can use a key pair to securely connect to your instance. Ensure that you have access instance.	to the selected key pair before you launch the			
	Key pair name - required				
	Select	C <u>Create new key pair</u>			
Feedback	Looking for language selection? Find it in the new Unified Settings 🔀	© 2023, Amazon Web Services, Inc. o	r its affiliates.	Privacy	Terms Cookie p

When you click "Create new key pair", a popup will appear asking you to "Create key pair". Give a name for your Key pair and make sure "RSA" is selected under the "Key pair type". Under "Private key file format", select ".pem".

aws	Services Q Search	[Option+S]	🔈 🔶 🕐 N. Virginia 🔻
🙋 EC2	🔞 VPC 🔯 RDS 🧱 IAM 😨 S3		
=	Key pair (login) Info You can use a key pair to securely connect to your instance. Ensu	Create key pair	×
		Key pairs allow you to connect to your instance securely. Enter the name of the key pair below. When prompted, store the private key in a secur and accessible location on your computer. You will need it later to connect to your instance. Learn more C	e
	▼ Network settings Info	Key pair name MySQL-AWS-Keys The name can include upto 255 ASCII characters. It can't include leading or trailing spaces.] type)
	Network Info vpc-86a464fb aws-east-vcn	Key pair type	
	Subnet Info subnet-0d02bdd8cdfa6bcf4 RDS-Pvt-subnet-2	K5A R5A encrypted private and public key pair ED25519	
		ED25519 encrypted private and public key pair (Not supported for Windows instances)	
	Firewall (security groups) Info A security group is a set of firewall rules that control to Instance.	Private key file format perm For use with OpenSSH	ar includes 750 × micro in the p is unavailable)
		For use with PuTTY	er AMs per
		Cancel Create key pair	Instance
	Amayhara		

• Note: click "Create key pair" afterwards. This will close the "Create key pair" popup and will download a private SSH Key. Look below:



aws	Services Q Search	[Option+S]	ג 🗘 👌 🕐 N. Virginia ▾ 📔
🙋 EC2	생 VPC 🔀 RDS 🔟 IAM 🔞 S3		
=	▼ Instance type Info		▼ Summary
	Instance type		Number of instances Info
	t2.micro Free tier eligible Family: t2 1 vCPU 1 GiB Memory On-Demand Linux pricing: 0.0116 USD per Hour On-Demand Windows pricing: 0.0162 USD per Hour	Compare instance types	Software Image (AMI) Provided by Red Hat, Inc. ami-08e637cea2f053dfa
	 Key pair (login) Info You can use a key pair to securely connect to your instance. Ensure that you have access to the instance. 	the selected key pair before you launch	Virtual server type (instance type) t2.micro Firewall (security group)
	Key pair name - required		New security group
	MySQL-AWS-Keys	 Create new key pair 	Storage (volumes) 1 volume(s) - 10 GiB
	▼ Network settings Info	Edit	Cancel Launch instance
Feedback	Looking for language selection? Find it in the new Unified Settings	© 20	123, Amazon Web Services, Inc. or its affiliates. Privacy Terms Cookie p
🗅 Mysq	JL-AWS-Kpem		sh

9. For your "Network settings", select your appropriate "VPC" and "Subnet". For "Auto-assign public IP" select "Enable". Under the "Firewall (security groups)" tab, choose "Create security group" and have an "Inbound security group rules" like the below one which allows SSH from anywhere.

aws	Services	Q Search [Option+S]	ג ¢° (ז N. Virginia ▼
🙋 EC2	🚳 VPC 1 🔯	RDS 🔟 IAM 😨 S3	
≡	▼ Netw	rork settings Info	
	VPC - requ	ired Info	
	vpc-86a	464fb (aws-east-vcn) (default) 🗸 C	
	Subnet Inf		
	Subnet-C VPC: vpc- IP address	J9aefc4c41359de3d aws-east-subnet1 B6a464fb Owner: 674147622433 Availability Zone: us-east-1e C C Create new sull Use available: 245 CIDR: 172.31.1.0/24)	bnet 🗹
	Auto-assig	gn public IP Info	
	Enable	▼	
	Firewall (A security g	security groups) Info roup is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your in	nstance.
	• Crea	ate security group	



aws	Services Q Search		[Option+S]		
🙋 EC2	😚 VPC 🛛 RDS 📴 IAM 📴 S3				
=	Firewall (security groups) Info A security group is a set of firewall rules that Create security group	t control the traffic for your instance. Add rules to	o allow specific traffic to reach your instance.		
	Security group name - required				
	launch-wizard-12				
	This security group will be added to all network characters. Valid characters: a-z, A-Z, 0-9, spectro characters in the character of the chara	vork interfaces. The name can't be edited after th baces, and:/()#,@[]+=&;{}!\$*	e security group is created. Max length is 255		
	launch-wizard-12 created 2023-01-03T13:53:36.888Z				
	Inbound security groups rules Security group rule 1 (TCP, 22)	, 0.0.0.0/0)	Remove		
	Type Info	Protocol Info	Port range Info		
	ssh	ТСР	22		
	Source type Info	Source Info	Description - optional Info		
	Anywhere 🔻	Q Add CIDR, prefix list or security ς	e.g. SSH for admin desktop		
		0.0.0.0/0 ×			
Feedback	Looking for language selection? Find it in th	e new Unified Settings 🖸	© 2023, Am		

10. Once that is done, leave everything as default and click "Launch instance"

Advanced network configuration	▼ Summary
	Number of instances Info
Configure storage Info	Advanced
1x 10 GiB gp2 • Root volum	Virtual server type (instance type) t2.micro Firewall (security group)
Add new volume	Storage (volumes) 1 volume(s) - 10 GiB
0 x File systems	Edit Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the
Advanced details into	Cancel Launch instance

11. You will have to wait until your MySQL-EC2 "Instance state" is "Running" before you can connect to it.

aws Services Q Searc	ch [Option+S] D 🔂 🖓	N. Virginia 🔻
🙋 EC2 🛛 VPC 🔯 RDS 🥫 IAN	M 🔁 S3	
New EC2 Experience	Instances (1) Info C Connect Instance state V Actions V La	unch instances
	Q Find instance by attribute or tag (case-sensitive)	< 1)
EC2 Dashboard	MySQL X Clear filters	
EC2 Global View	□ Name ▼ Instance ID Instance state ▼ Instance type ▼ Status ch	eck Alar
Events	MvSQL-EC2 i-06e9259bd0711c	ecks passed No a
Tags		
Limits		

12. Once your EC2 instance is in a "Running" state, open the Private SSH Key that you downloaded in Step 8 in a text editor of your choice.

Name	
MySQL-AWS-Keys.pem	

13. Once you have opened your Private SSH Key in a text editor, copy the contents of the entire file as shown below:

••		MySQL-AWS-Keys.pem
4 ►		MySQL-AWS-Keys.pem ×
1		BEGIN RSA PRIVATE KEY
2	2	MIIEoQIBAAKCAQEAi8zI5AlppfUZg/TImM3ggTCY237tTRANQjUasZNDbU6U0FUa
3	3	Zv
	ļ	e:
5		CITLlTqDVDtb Show Unsaved Changes KEyVe7Bpd8fxp3RHIDJRAcmGRMfbB8DaXwMrPR
6		NHRZNT3nwrzU uM98n+8ey09EE0r3+zJpbpGuKxc0noh6Cxygb1
7		BPky4udYyQXK Corv NsyBu4/cqn9QIDAQABAoIBACYX/T22GuWv7e35
8		C5gnsV9CoMRe Paste /Kw94o8nLVE2+zsm1bYe+vvKUNwQy7mK+2Trp7
9		m3PEPLYKcx+U 7tXAhAkK5B2XbvIuvDQxwto9T0VTTlkDPfCGJv
10		/AJH5n+31s3B yKpQ6YKFxa206E6cCP8mlI7y0xKvlaRcj9fckR
11		QRmNkAbMNMCG conv Ella Path ynBwgX//2DzCDTypB9Z1DQ8PhfmHsbeMBID7TD
12		v+Y46wDGnA+f Reveal in Side Bar sQlECE63eJK0PinTPFvl1ZVBQAHA0qivtVuhYr
13	3	1C7Xn4ECgYEAwwwxooxyuu/ikxWiCv5PtjDnMa2EZ19jSmA1e/82pcTajdtRGAiq
14	ļ	a. Lu
15		Zh InC
16		u(
17		Z(aP
18		CV '11
19		Uc AB
20		G(
21		k) OF
22		Uł .VM
23	3	P1
24	ļ	g: Pe
25		wfUk
26		3uyNuHelTQBzpc+dLRUFbXdpJ2UpkvsLgqcvwa0GVrrw1QiuRw==
27		END RSA PRIVATE KEY
2	27	1674 characters selected

14. After copying the contents, to connect to your EC2 instance, go to your terminal where you will be accessing EC2 from. There, create a new file called *id_rsa* inside your home directory. The guide uses the "nano" text editor, use a text editor of your own choice.

\$ cd \$ nano id_rsa						
ra	pa-mac	~	%	cd		
ra	pa-mac	~	%			
ra	pa-mac	~	%	nano	id_	rsa

• • •		🚾 ravishpa —	nano id_rsa — 80×23		
			nano id_rsa		
UW PICO 5.	09		File: id 1	rsa	
Conv					
Paste					
	1				
Mark					
Mark as Bookmark					
Unmark					
Show Inspector					
<pre>^G Get Help</pre>	^O WriteOut	^R Read File	<u>^Y Prev Pg</u>	<mark>^K</mark> Cut Text	^C Cur Pos
AX Evit	^l Justify	AW Where is	AV Next Pa	All UnCut Text	tAT To Spell
		M MICLC IS	i nort ry	o onout rex	o i lo operr



- 15. After pasting the contents of the private SSH key into the *id_rsa* file, save and close the file. If you are using nano:
 - to paste the copied content: command + V
 - to save the file: control + 0
 - to exit the file: control + X

UW PICO 5.09	File:	id_rsa
_		
BEGIN RSA PRIVATE KEY		
MIIEoQIBAAKCAQEAi8zI5AlppfUZg/TImM3ggTCY237tTRANQjUasZNDbU6U0	FUa	ļ
Ζι	ÎrH	i i
el	3pA	
Ci	:PR	i i
N	ıb1	i i
BI	35	i i
C	:p7	i i
m;	JV	į –
	;kR	i i
Q	TD	į –
V)Yr	i i
1	vid	i i
	nLu /= 0	i i
21		į –
	(E4	i i
	NaP	i i
		i i
	4D	į –
		į –
		į –
		i i
	/Do	i i
9. wl	vilk	
3uvNuHelT0Bzpc+dLRUEbXdpJ2UpkysLggcywa0GVrrw10juRw==		
END RSA PRIVATE KEY		

16. After you have saved the private SSH Key on your terminal, grab the file path of the id_rsa. To get the file path of your current working directory where you have the id_rsa, execute:

\$ ls \$ pwd					
	-mac	~	%	ls	
id_rsa					
r	mac	~	%	pwd	
/Users/r					
r	-mac	~	%		

• Note: by looking at the above image, the id_rsa location for this guide will hence be /Users/r***/id_rsa

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17. Once you have your SSH Key copy and pasted, make sure to change the Private SSH key's permission by executing:

\$ chmod 400 id_rsa							
r	mac	~	%	chmod	400	id_	_rsa

18. You can now connect to the EC2 Instance you created earlier by executing the following from your terminal window where you have the SSH keys:

ssh -i <path th="" to="" yo<=""><th>ou-private-ssh</th><th>n-key> ec2-user</th><th>@<ec2-public-dns></ec2-public-dns></th><th></th></path>	ou-private-ssh	n-key> ec2-user	@ <ec2-public-dns></ec2-public-dns>	
	-mac ~ % ssł	n —i id_rsa ed	2-user@e	:ompute-
1.amazonaws.com				
Register this sy	stem with Red	d Hat Insights	s: insights-clier	tregister
Create an accoun	t or view all	l your systems	s at https://red.	ht/insights-dashb
oard				
Last login: Fri	Jan 27 15:48:	:41 2023 from		
[ec2-user0:	5	\$		

- Note: after executing the above SSH command, when prompted "Are you sure you want to continue connecting (yes/no/[fingerprint])?", type "yes".
- 19. You are now successfully connected to your EC2 instance.



Section C: Connect to your EC2 Instance and install MySQL Shell

20. Once you have identified your Amazon Aurora MySQL version and the data you want to migrate, go to your AWS environment and connect to the EC2 instance you created in Section B. You now need to install MySQL Shell on your EC2 instance. You will use MySQL Shell to export the world database and import it into MySQL HeatWave. (MySQL Shell is an advanced client and code editor for MySQL. To learn more about MySQL Shell, visit: https://dev.mysql.com/doc/mysql-shell/8.0/en/)

Installing MySQL Shell on Microsoft Windows:

To install MySQL Shell on Microsoft Windows using the MSI Installer, perform the following steps:

- a) Download the Windows (x86, 64-bit), MSI Installer package from
 - http://dev.mysql.com/downloads/shell/
- b) When prompted, click Run.
- c) Follow the steps in the Setup Wizard.

Installing MySQL Shell on Linux:

To install MySQL Shell on Linux, run the following command:

sudo yum install mysql-shell

For other Linux installation options, visit: <u>https://dev.mysql.com/doc/mysql-shell/8.0/en/mysql-shell-install-linux-quick.html</u>

Installing MySQL Shell on macOS:

To install MySQL Shell on macOS, perform the following steps:

- a) Download the package from http://dev.mysql.com/downloads/shell/.
- b) Double-click the downloaded DMG to mount it. Finder opens.
- c) Double-click the .pkg file shown in the Finder window.
- d) Follow the steps in the installation wizard.
- e) When the installer finishes, eject the DMG (It can be deleted).



This is how the guide installed MySQL Shell, visit: <u>https://dev.mysql.com/downloads/shell/</u>. Select the latest version of the MySQL Shell and select the appropriate OS System and Version. For this guide, Red Hat Enterprise Linux 9 server is being used for the EC2 instance.

General Availability (GA) Releases	Archives	()		
MySQL Shell 8.0.31				
Select Operating System:				
Red Hat Enterprise Linux / Oracle Li	inux	~		
Select OS Version:				
Red Hat Enterprise Linux 9 / Oracle	Linux 9 (x86	, 64-bit) 🗸		
RPM Package		8.0.31	28.2M	Downlo
(mysql-shell-8.0.31-1.el9.x86_64.rpm)			MD5:cela3045abddc5e3	361bf3a8144c4
RPM Package, Debug Information		8.0.31	270.9M	Downlo

- Note: the RPM Package (28.2M), without the debug information was chosen for this guide. Once you have identified which MySQL Shell version you want to download, click on the "Download" button shown in the above image. A new page will popup, which is shown in the next step.
- 21. When you click "Download" as shown in Step 20, this page will come up. Right click on "No thanks, just start my download." and select "Copy Link Address"

MySQL Communi	ty Downloads
Login Now or Sign Up for a free	account.
An Oracle Web Account provides you w	ith the following advantages:
Fast access to MySQL software downl	oads
Download technical White Papers and	d Presentations
Post messages in the MySQL Discussion	on Forums
Report and track bugs in the MySQL because the second s	bug system
Log using my Orace MySQL.com is using Oracle SSO fo the Login link. Otherwise, you can following the instructions.	in » e Web account Sign Up » for an Oracle Web account r authentication. If you already have an Oracle Web account, click Open Link in New Tab Open Link in New Window Open Link in Incognito Window
No thanks, just start my download.	Save Link As Copy Link Address Copy Copy Link to Highlight Search Google for "No thanks, just start my download." Print



22. Go back to your AWS EC2 instance and download MySQL Shell via wget by pasting the link copied in the previous step. But first, download wget itself



- Note: download and install MySQL Shell by using the proper commands/files/methods required for your own Operating System.
- 23. Once MySQL Shell RPM file is downloaded on your your EC2 instance, extract it using

<pre>sudo rpm -ivh <file-name></file-name></pre>	
[ec2-user@ip-]\$ sudo rpm -ivh mysql-shell-8.0.31-1.el8.x86_64.rpm	1
warning: mysql-shell-8.0.31-1.el8.x86_64.rpm: Header V4 RSA/SHA256 Signature, key ID 3	3a7
9bd29: NOKEY	
error: Failed dependencies:	
libcrypto.so.1.1()(64bit) is needed by mysql-shell-8.0.31-1.el8.x86_64	
libcrypto.so.1.1(OPENSSL_1_1_0)(64bit) is needed by mysql-shell-8.0.31-1.el8.>	x86
_64	
libcrypto.so.1.1(OPENSSL_1_1_1)(64bit) is needed by mysql-shell-8.0.31-1.el8.>	x86
_64	
libssl.so.1.1()(64bit) is needed by mysql-shell-8.0.31-1.el8.x86_64	
libssl.so.1.1(OPENSSL_1_1_0)(64bit) is needed by mysql-shell-8.0.31-1.el8.x86	_64
libssl.so.1.1(OPENSSL_1_1_1)(64bit) is needed by mysql-shell-8.0.31-1.el8.x86	_64
[ec2-user@ip- I\$	

• Note: there were missing dependences when the rpm command was executed



24. To resolve the above dependency, run the following command:

```
sudo yum install compat-openssl11
```

25. Once all the required dependencies are installed, execute the same rpm command from Step 23

• Note: MySQL Shell was properly installed after all the dependencies were solved



II. Exporting the database

Section D: In AWS, create an S3 Storage Bucket

26. Login to your AWS account.

	Services	Q Search		[Option+S]		► 🗘 🖗 🕐 N. Virginia 🔻
G vi	PC 🧱 F	RDS 🗧 IAM 📴 S3				
Со	nsol	e Home Info				Reset to default layout + Add widgets
(i) Intro	oducing 4 new widgets for Console I	Home.			×
	Now	you can view the Security Hub, Mana	aged instances,	Ops summary, and Patch compliance wide	gets. Find them at	the bottom of your Console Home.
	Rece	ently visited Info			:	Welcome to AWS
ف	P EC2		1	S3		Getting started with AWS 🛽
4	0 VPC	:		AWS Budgets		Learn the fundamentals and find valuable information to get the most out of AWS.
0		l.	(III);	Database Migration Service		
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27. Click the 'Services' menu on the top-left corner. From there, navigate to 'Storage' and click on "S3"



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28. Once you are on the 'S3' Buckets page, click the "Create bucket" button. In a later step, you will export your Amazon Aurora MySQL database to AWS in this bucket.

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Amazon S3 ×	③ Follow security best practices for S3.	Learn more
Buckets	Amazon S3 > Buckets	
Access Points Object Lambda Access Points Multi-Region Access Points	Account snapshot Storage lens provides visibility into storage usage and activity trends. Learn more	ns dashboard
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Block Public Access settings for this account	C Copy ARN Empty Delete Create bucket	(1) 🛞

29. On the 'Create bucket' page, give a name for your bucket and select "US East (N. Virginia)" as the 'AWS Region'

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30. Leave the other fields as-is and click the "Create bucket" button.

Obj Stor	ect Lock e objects using a write-once-read-many (WORM) model to help you prevent objects from being deleted or overwritten for a fixed unt of time or indefinitely. Learn more 🔽
0	Disable
C	Enable Permanently allows objects in this bucket to be locked. Additional Object Lock configuration is required in bucket details after bucket creation to protect objects in this bucket from being deleted or overwritten.
	3 Object Lock works only in versioned buckets. Enabling Object Lock automatically enables Bucket Versioning.
~	

• Note: once the S3 bucket is created, save the bucket name in a notepad for later use.

Section E: Add an IAM user and download the .csv file

31. From the AWS Console, navigate to the 'Services' menu. From there, navigate to 'Security, Identity, & Compliance' and look for "IAM"

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32. From the 'Identity and Access Management (IAM)' dashboard page, click on "Users" under 'Access management'

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 Access management
User groups
Roles
Policies
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33. After landing on the 'Users' page, click "Add users"

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Policies Identity providers Account settings	None Never None	None 🛇 5 hor



34. On Step 1 of 'Create user', enter a 'User name'. Click "Next" afterwards.



35. On Step 2, click "Attach policies directly" and select the 'AdministratorAcess' policy. Leave everything as it is and click "Next" afterwards

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	Step 2	Add user to an existing group of create a new one. Using groups is a best-practice way to	manage user's permissions by job functions, Learn more E
	Set permissions	Permissions options	
	Step 3 Review and create	Add user to group Add user to an existing group, or create a new group. We recommend using groups to manage user permissions by job function.	As, attached managed from an existing user. As a best practice, we recommend attaching policies to a group instead. Then, add the user to the appropriate group.
		Get started with groups Create a group and select policies to attach to the group. We recommend using AWS service access, or custom permissions. Learn more 🗹	groups to manage user permissions by job function,
		 Permissions boundary - optional Set a permissions boundary to control the maximum permissions for this user. Use this advanced 	d feature used to delegate permission management to others. Learn more 🔀
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36. On Step 3, review all the information for accuracy. Click the "Create user" button afterwards.

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37. Once the User has been created, from the 'Users' page of IAM, click on the User we just created in the previous step

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38. After your User page opens for the User that was just created, click on "Security credentials" and scroll down until you see "Access keys"

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Image: Services Q. Search Identity and Access X Management (IAM) X Identity and Access X Management (IAM) X Q. Search IAM X Dashboard X Vser groups Vsers Roles Policies Identity providers Account settings X Access analyzer Archive rules Analyzers Settings Credential report	Multi-factor authentication (MFA) Use MFA to increase the security of your AWS environ MFA devices assigned. Learn more (2* Remove Resync Assign MF Device type No MFA devices No MFA devices Access keys (0) Use access keys (0) Use access keys (0) Use access keys (0) Access keys (0) As a best practice, avoid using long-term	[Option+S] (O) ament. Signing in with MFA res FA device Identifier Assign an MFA device to Assign rom the AWS CLI, AWS Tools f C No a credentials like access key Creat	© 2025, Amazon Web Set quires an authentication code fr improve the security of you a MFA device for PowerShell, AWS SDKs, or dir access keys rs. Instead, use tools which p e access key	vites, Inc. or its affili om an MFA device. E Created o ir AWS environme ect AWS API calls. Yo provide short term	ates. Pri ach user can i n nt u can have a n credential	maximum o	of two	
Image: Services Q Search Identity and Access X Management (IAM) X Identity and Access X Management (IAM) X Q Search IAM Dashboard X Access management User groups Users Roles Policies Identity providers Account settings X Access analyzer Archive rules Analyzers Settings Credential report Organization activity	Multi-factor authentication (MFA) Use MFA to increase the security of your AWS environ MFA devices assigned. Learn more (2 Remove Resync Assign MF Device type No MFA devices No MFA devices Access keys (0) Use access keys (0) Use access keys (0) Use access keys (0) Access keys (0) As a best practice, avoid using long-term	[Option+S] (0) ament. Signing in with MFA res FA device Identifier . Assign an MFA device to Assign rom the AWS CLI, AWS Tools f C No a credentials like access key Creat	© 2025, Amazon Web Set quires an authentication code fr improve the security of you a MFA device for PowerShell, AWS SDKs, or dir access keys rs. Instead, use tools which p e access key	vites, Inc. or its affili om an MFA device. E Created o ir AWS environme ect AWS API calls. Yo provide short term	ates. Pri ach user can i n n u can have a n credential	maximum o	of two	
WS If Services Q. Search Identity and Access Management (IAM) X Q. Search IAM X Q. Search IAM X Dashboard X Access management Users Roles Policies Identity providers Account settings Xecess analyzer Archive rules Analyzers Settings Credential report Organization activity Service control policies (SCPs) X	Multi-factor authentication (MFA) Use MFA to increase the security of your AWS environ MFA devices assigned. Learn more ? Remove Resync Assign MF Device type No MFA devices Device type No MFA devices Access keys (o) Use access keys to send programmatic calls to AWS fi access keys (active or inactive) at a time. Learn more Create access key As a best practice, avoid using long-term	[Option+S] (0) ament. Signing in with MFA res FA device Identifier . Assign an MFA device to Assign rom the AWS CLI, AWS Tools f C non the AWS CLI, AWS Tools f C No a credentials like access key	© 2025, Amazon Web Set quires an authentication code fr improve the security of you i MFA device for PowerShell, AWS SDKs, or dir inccess keys rs. Instead, use tools which r e access key	vites, Inc. or its affili om an MFA device. E Created o ir AWS environme ect AWS API calls. Yo provide short term	ates. Pri ach user can l ach user can l n nt u can have a n credential	maximum o	of two	

• Note: when you locate the 'Access keys' section, click on "Create access key"



39. On Step 1 of 'Create access key', locate and select "Other". Click "Next" afterwards





40. On Step 2, leave the values blank and click the "Create access key" button



41. On Step 3, your "Access key" will be created alongside the "Secret access key". Save these two keys in a notepad for later use. Click "Download .csv file" to save the Access key and Secret access key in a .csv file. Click "Done" after downloading the .csv file

aws	Services Q Search	[Option+S]	۶.	\$° (?	Global	•
🙋 EC2	🔞 VPC 🔯 RDS 🧰 IAM 📴 S3					
≡	IAM > Users > migration-user > Cre	eate access key				0
	Step 1 Access key best practices & alternatives	Retrieve access keys				
	Step 2 - optional Set description tag	Access key If you lose or forget your secret access key, you cannot retrieve it. Instead, create a new access key and make the old key inactive.				
	Step 3	Access key Secret access key				
	Retrieve access keys	AKIAZZ5SULYQ3ROZOX4P				
		Access key best practices				
		Never store your access key in plain text, in a code repository, or in code.				
		Disable or delete access key when no longer needed.				
		Enable least-privilege permissions. Rotate access keys regularly.				
		For more details about managing access keys, see the Best practices for managing access keys.				
		Download .csv file	one			
Feedback	: Looking for language selection? Find it in the n	ew Unified Settings 🖸 © 2023, Amazon Web Services, Inc. or it	s affiliates	i. Privacy	Terms	Cookie preferences

Section F: Create a credentials file in your EC2 instance

42. After creating the bucket and adding a user in AWS, go back to your EC2 instance where you have MySQL Shell installed.

On the EC2 instance where MySQL Shell is installed, create a new directory called ".aws" inside your home directory. Next, go into the ".aws" directory and create a file called "credentials". After the file is created, copy and paste the below contents in that "credentials" file.

```
[default]
aws_access_key_id=
aws_secret_access_key=
region=
```

The commands used to achieve this step for the guide are listed below:



• Note: to download nano, execute sudo yum install nano -y

43. After pasting the "credentials" file contents from Step 42, below is how your "credentials" file should look like



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44. Inside the 'credentials' file, for the "aws_access_key_id" and "aws_secret_access_key" fields, fill them using the .csv file we downloaded in Step 41. For "region", since we have a Bucket created in us-east-1 and the MySQL HeatWave system that we will create in the later steps will also be in the same region, enter

us-east-1

After filling all the information for your credentials file, you should have something like this:



- Note: save the "credentials" file after filling all the missing fields. If you are using nano,
- to paste the copied content: command + V
- to save the file: control + 0
- to exit the file: control + X



Section G: Connect to your Amazon Aurora MySQL Server using MySQL Shell and execute the util.dumpInstance() utility

45. Using MySQL Shell installed on your EC2 instance, connect to your Amazon Aurora MySQL Server by executing (account with Root privilege necessary):



• Note: anytime you login using MySQL Shell, MySQL Shell will display the MySQL Shell version and MySQL Sever version currently being used. You can see this in the image above.

- 46. Once you are inside MySQL Shell, you can interact in three different modes. The default is JavaScript, the other ones you can choose from are SQL and Python. Once inside MySQL Shell:
 - to switch to JavaScript mode, execute: \js
 - to switch to SQL mode, execute: \sql
 - to switch to Python mode, execute: \py

47. Make sure you are in JavaScript mode by typing \js and execute the dumpInstance utility to export the dump data into AWS S3 Storage bucket.

MySQL	JS>	∖js
-------	-----	-----

MySQL JS> util.dumpInstance("sampledump" ocimds: "true", compatibility: ["strip_r "ignore missing pks"], users: "true", dr	<pre>,{s3bucketName: "heatwave-s3", estricted_grants", "strip_definers", yRun: "true"})</pre>
MySQL database_1 eluct	rde amazonawa 18 Nutil dumpInctance("compld
dump",{s3bucketName: "heatwave-s3", ocimds: " "strip_definers", "ignore_missing_pks"], use dryRun enabled, no locks will be acquired and	<pre>true", compatibility: ["strip_restricted_grants", rs: "true", dryRun: "true"}) no files will be created.</pre>
NOTE: Backup lock is not supported in MySQL 5	.7 and DDL changes will not be blocked. The dump
may fail with an error if schema changes are	made while dumping.
Acquiring global read lock	
WARNING: The current user lacks privileges to	acquire a global read lock using 'FLUSH TABLES W
ITH READ LOCK'. Falling back to LOCK TABLES	
ERROR: The current user does not have require	d privileges to execute FLUSH TABLES WITH READ LC
CK.	
Backup lock is not supported in MySQL 5.7 The gtid_mode system variable is set to O	and DDL changes cannot be blocked. FF or OFF_PERMISSIVE.
Ine log_bin system variable is set to UFF	or the current user does not have required privi
Teges to execute SHOW MASTER STATUS.	
EPPOP: Upable to acquire global read look poi	ther table read looks
Clobal road look has been released	LHEI LADIE IEAU IOCKS.
Util dumpInstance: While 'Initializing': Upah	le to lock tables. Consistency check has failed
(MYSOLSH 52002)	te to fock tables. Consistency check has failed.
MVSQL database-1 cluster-	s.amazonaws JS

Note:

- The util.dumpInstance() utility will take a dump of all the databases except "mysql, sys, performance schema, and information schema". The dump comprises of DDL files for the schema structure and tab-separated .tsv files containing the actual data. Additionally, you can also use util.dumpSchemas() or util.dumpTables() if you only want to dump specific schemas or tables. The three dump utilities can export the data into:
- a) Object Storage bucket in Oracle Cloud
- b) S3-compatible buckets
- c) local filesystem
- This guide showcases option b). For more information, refer: <u>https://dev.mysql.com/doc/mysql-shell/8.0/en/mysql-shell-utilities-dump-instance-schema.html#mysql-shell-utilities-dump-opt-run</u>
- The dryRun option runs the export command but does not generate any output export file. It displays information about what would be dumped with the specified set of options, and about the results of MySQL HeatWave compatibility checks (if the ocimds option is specified, which is required for this guide), but does not proceed with the dump. Setting this option enables you to list out all the compatibility issues before starting the dump. The default is false. You can read more about the utility options at https://dev.mysql-shell-utilities-dump-opt-control
- In the command above, sampledump is the prefix under which all the exported dump files will be stored in S3 Storage bucket in AWS.
- Change the s3bucketName to match with what you have when you created your bucket in AWS in Step 30.
- Setting the ocimds: true option ensures compatibility of the export dump with MySQL HeatWave.

- Primary keys are required on every table for using MySQL HeatWave.
- If you can't seem to solve an error during the dryRun, contact a MySQL Solution Engineer for guidance: <u>https://go.oracle.com/LP=132857?src1=:ow:o:s:po:::&intcmp=:ow:o:s:po</u>:::
- To understand the dumpInstance(), dumpSchemas(), or dumpTables() utility in more detail, refer to this website: <u>https://dev.mysql.com/doc/mysql-shell/8.0/en/mysql-shell-utilities-dump-instance-schema.html</u>
- 48. Running the commands in Step 47 may generate "Errors" regarding "table locks" (see the image in Step 47). If (and only if) you do encounter such an error, execute the same command but add an additional option "consistent: false"

MySQL JS> util.dumpInstance("sampledump",{s3bucketName: "heatwave-s3", ocimds: "true", compatibility: ["strip restricted grants", "strip definers", "ignore missing pks"], users: "true", dryRun: "true", consistent: "false"}) MySQL database-1.c. s-east-1.rds JS > util.dumpInstance("sampl edump",{s3bucketName: "heatwave-s3", ocimds: "true", compatibility: ["strip_restric ted_grants", "strip_definers", "ignore_missing_pks"], users: "true", dryRun: "true"
, consistent: "false"}) dryRun enabled, no locks will be acquired and no files will be created. Initializing - done 1 out of 5 schemas will be dumped and within them 3 tables, 0 views. 2 out of 3 users will be dumped. Gathering information - done WARNING: The dumped value of gtid_executed is not guaranteed to be consistent Checking for compatibility with MySQL Database Service 8.0.31 NOTE: MySQL Server 5.7 detected, please consider upgrading to 8.0 first. Checking for potential upgrade issues. The MySQL server at database-1.cluster-c L.rds.amazonaws.com:3306, version 5.7.12 - MySQL Community Server (GPL), will now be checked for compatibility issues for upgrade to MySQL 8.0.31...

1) MySQL 8.0 syntax check for routine-like objects

16) Check for invalid table names and schema names used in 5.7 No issues found Errors: a Warnings: 1 Notices: 0 NOTE: No fatal errors were found that would prevent an upgrade, but some potential issues were detected. Please ensure that the reported issues are not significant be fore upgrading. NOTE: User 'rdsadmin'@'localhost' had restricted privileges (CREATE TABLESPACE, FIL E, RELOAD, SHUTDOWN, SUPER) removed NOTE: User 'root'@'%' had restricted privileges (INVOKE COMPREHEND, INVOKE LAMBDA, INVOKE SAGEMAKER, LOAD FROM S3, RELOAD, SELECT INTO S3) removed Compatibility issues with MySQL Database Service 8.0.31 were found and repaired. Pl ease review the changes made before loading them. Validating MDS compatibility - done Writing global DDL files Writing users DDL Writing DDL - done Starting data dump 0% (0 rows / ~5.30K rows), 0.00 rows/s, 0.00 B/s uncompressed, 0.00 B/s compressed MySQL database-.us-east-1.rds JS >

49. Once you have executed the command in Step 47/48 and did not see any errors or warnings, execute the same Step 47/48 command. Although, this time change the dryRun option to false

MySQL JS> util.dumpInstance("sampledump",{s3bucketName: "heatwave-s3", ocimds: "true", compatibility: ["strip restricted grants", "strip definers", "ignore missing pks"], users: "true", dryRun: "false", consistent: "false"}) s-east-1.rds JS > util.dumpInstance("sampl MySQL database-1.c edump",{s3bucketName: "heatwave-s3", ocimds: "true", compatibility: ["strip_restric ted_grants", "strip_definers", "ignore_missing_pks"], users: "true", dryRun: "false ", consistent: "false"}) Initializing – done 1 out of 5 schemas will be dumped and within them 3 tables, 0 views. 2 out of 3 users will be dumped. Gathering information - done WARNING: The dumped value of gtid_executed is not guaranteed to be consistent Checking for compatibility with MySQL Database Service 8.0.31 NOTE: MySQL Server 5.7 detected, please consider upgrading to 8.0 first. Checking for potential upgrade issues. The MySQL server at database-1.cl -east-1.rds.amazonaws.com:3306, version 5.7.12 – MySQL Community Server (GPL), will now be checked for compatibility issues for upgrade to MySQL 8.0.31... 1) MySQL 8.0 syntax check for routine-like objects



• Note: once the dump process is complete, MySQL Shell will display a summary of the dump process like the one shown above.



III. Importing the database

Section H: Navigate to the S3 Storage bucket to confirm if the dump was successful

50. Once the export dump operation has completed, go back to your AWS S3 Storage bucket created in Step 30 and locate the dump files under the sampledump prefix



aws Services Q Search	[Option+S]		ג ়ি ? Global ▼
📴 EC2 🛛 VPC 🚺 RDS 🔟 IAM 🐨	\$3		
A	Amazon S3 > Buckets > heatwave-s3 > sampledump/		
Amazon S3 ×	completium (D Copy S3 U
Duralizata	sampledump/		
Access Points			
Object Lambda Access Points	Objects Properties		
Multi-Region Access Points			
Batch Operations	Objects (19)		
Access analyzer for S3	Objects are the fundamental entities stored in Amazon S3. You can need to explicitly grant them permissions. Learn more [use Amazon S3 inventory 🔀 to get a list of all object	s in your bucket. For others to access your objects, you'l!
Block Public Access settings for this account	C C Copy S3 URI C Copy URL	월 Download Open [2] Delet	te Actions Create folder
▼ Storage Lens	Q. Find objects by prefix		< 1 > (
Dashboards			
AWS Organizations settings	Name 🔺	Type	
	@.done.json	json November 29, 2022, 16:18:44	4 (UTC-06:00) 381.0 B Standard
Feature spotlight 3	🗆 🕒 @.json	json November 29, 2022, 16:18:44	4 (UTC-06:00) 874.0 B Standard
	@.post.sql	sql November 29, 2022, 16:18:44	(UTC-06:00) 240.0 B Standard
A 100 M 1 1 1 1 7 6 77	🗆 🕒 @.sql	sql November 29, 2022, 16:18:44	(UTC-06:00) 240.0 B Standard
AWS Marketplace for 55	nd it in the new Unified Settings	sol November 29 2022 16:18:44	L(UTC-06:00) 1.2 KB Standard
recublick cooking for language selection: in		© 2022, Allazofi web Services,	inc. of its annuales. I mady Terris Cookie p



Section I: Create a MySQL HeatWave System

51. After completing all the above Steps, navigate to "cloud.mysql.com" to provision your MySQL HeatWave on AWS instance (assuming you have enabled MySQL HeatWave on AWS from OCI)



- Note: on the above page, enter your OCI Account Name and click "Continue". Afterwards, you will be prompted to enter your Oracle Cloud 'User Name' and 'Password'.
- 52. Once you are logged in, this is what the home screen looks like: the MySQL HeatWave on AWS Console



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53. Click the "Create MySQL DB System" button

MySQL H ORACLE	leatWave		©	:om 🔻
	Getting Started MySQL Database Systems and HeatWave Clusters work toge query acceleration for your OLTP, OLAP, and ML workloads.	ther to provide high performance	Create MySQL DB System	
		1111		
	(LEFE			
My	SQL Database	HeatWave		
MySC	L Database is a fully managed database system built on MySQL prise Edition that lats developers quickly create and deploy secure cloud	HeatWave is a massively parallel, high p accelerator for MuSOL database systems that	erformance, in-memory query	
同 Introduction	🖯 MySQL 🗱 HeatWave Clusters 🖽 Workspaces 🔟 Pe	rformance		

• Note: You can also perform the same action by clicking the 'MySQL' tab at the bottom of the page and then clicking the 'Create MySQL DB System' button

	MySC)L HeatWave =∟∈	l.		
	DB Systems	Backups	ROKOL NY A		
	🕀 Create M	ySQL DB System	art Stop Restart	Actions 🔻	Q State
0.1	Name 🗘		State	HeatWave Clu	ster He
	Salact a MuS	OLDE Sustan about	The p	No DB Syste	ms found d not match any resource:
	Select a MyS	QL DB System above			
1	国 Introductio		😵 HeatWave Clusters	Workspaces	<u> 냄'</u> Performance



54. After clicking on "Create MySQL DB System", enter a name for your MySQL DB system. Then, create an Admin 'Username' and 'Password'.

	MySQL HeatWa	ave		Create MySQL DB System and H	leatWave Cluster
			1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	0	2
	OB Systems Backups			MySQL DB System	HeatWave Cluster
	Create MySQL DB System	Start Stop Restart	Actions 🔻	Basic information	
	Name 🗘	State	HeatWa	Display name HWonAWS	
			No DE	Description Testing migration to HeatWave on AWS	
			The provided filter op		
1				Administrator credentials	
				Username root	
				Password	۵
	Select a MySQL DB System abo	ive		Confirm password	۵
E		L 🎇 HeatWave Clusters	Workspaces		Cancel Next

55. Scroll down and choose the appropriate 'Hardware configuration' and 'Data storage size'. The minimum storage size you can select is 32 GB. The maximum storage size is 65 TB. For your InnoDB storage, if it is greater than 1 TB, we recommend you switch to the 32.256GB shape. Leave the 'Maintenance window' and 'Availability zone' as-is.

Create MySQL DB System	and HeatWave Cluster		
1 MySQL DB System	(2) HeatWave Cluster		
Hardware configuration			
MySQL.2.16GB	MySQL.4.32GB		
MySQL.8.64GB	MySQL.32.256GB		
Data storage size (GiB) 32		~	^
Database version			
8.0.31			
Maintenance window ①			
Select start time			
Automatic Manual			



56. Under 'Networking' and 'Allowed client addresses', enter the Public IP address of your EC2 Compute Instance that we created in the earlier step, followed by a '/32'.

Networking		
Allowed client addresses		
Enter semicolon-separated IP address ranges in CIDR notation (e.g. 1.2.3.4/32)		
Port		
X Plugin Port		
	Cancel	Next

- Note: click "Next" after you have entered at least one client address under the 'Allowed client addresses'
- 57. After clicking Next, you will be taken to Page 2 where you will create a HeatWave Cluster. Name your HeatWave Cluster whatever you want and chose the appropriate "HeatWave Cluster Configuration". For the "Shape", you can either choose a Cluster Node of 16 GB (can handle ~25 GB of data) or a Cluster Node of 256 GB (can handle ~400 GB of data). The "Cluster Size" can go from 1 to 128. Here we will use the "HWonAWS-Cluster" name, 16GB Shape and Cluster Size of 1

Create MySQL DB System	and HeatWav	e Cluster	
(1)		2 HeatWave Cluster	
Basic information			
Display name HWonAWS-Cluster			
Description			
HeatWave Cluster Configuration			
HeatWave.16GB	HeatWave.256GB		
Cluster Size 1			~ ^
		Cancel Back	Create



58. Click "Create" as shown in the above image, once you are done with everything. After a few minutes, your MySQL HeatWave System will be created and will be in an "Active" State

MySQL HeatV ORACLE	Vave			⑦ acle.com ▼
DB Systems Backups	Vienciech 🔪			
Create MySQL DB System	Start Stop Restart	Actions 🔻	Q State Any State - Sear	rch Name
Name 🗘	State	HeatWave Cluster	HeatWave State	Created ~
HWonAWS	Creating	HWonAWS-Cluster	Creating	Tue, 29 Nov 2022 23:41:25 GMT

MySQL HeatWa	ave			⑦ oracle.com ▼
DB Systems Backups				
Create MySQL DB System	Start Stop	Restart Actions 👻	Q State Any State -	Search Name
Name 🗘	State	HeatWave Cluster	HeatWave State	Created ~
HWonAWS	Active	HWonAWS-Cluster	 Active 	Tue, 29 Nov 2022 23:41:25 GMT

59. Once the System is created, click on the "Name" of your system. This will take us to the "DB Systems Details" page where we can view a variety of information regarding your MySQL HeatWave System.

MySQL HeatWa ORACLE	ave
	~~~~
DB Systems Backups	
Create MySQL DB System	Start
Name 🗘	
<u>HWonAWS</u>	

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60. You will then be taken to the "DB Systems Details" page

MySQL HeatWav ORACLE	re .		0
MySQL » DB Systems » Details			
HWonAWS			
Create Backup Edit DB Syste	m Start Stop Restart Delete		
Summary			
State	Resource ID		Host Name
<ul> <li>Active</li> </ul>			m.us-east-1.aws.cloud.mysql.com
Shape			
MySQL.2.16GB			
DB System Information Bar	ckups		
General Information		DB System Configura	tion
Description	_	Storage Size	
Introduction SMySQL	総 HeatWave Clusters	딸 HeatWave ML 년	<u>l</u> Performance

• Note: here, copy the "Host Name" for later use



#### Section J: Import the dumped data using the util.loadDump() utility

61. After noting down the Host Name, log back into your EC2 instance where we have the 'credentials' file and MySQL Shell installed. Using MySQL Shell, log in to your MySQL HeatWave instance (the EC2 instance whose IP you entered in 'Allowed Client Addresses' in Step 56)

<pre>ssh -i <path to="" you-private-ssh-key=""> ec2-user@<ec2-public-< pre=""></ec2-public-<></path></pre>	-DNS>
then	
<pre>\$ mysqlsh <username>@<hostname></hostname></username></pre>	
or	
<pre>\$ mysqlsh -u <username> -h <hostname> -P <portnumber> -p</portnumber></hostname></username></pre>	
r	.compute-1.amazonaws. register /insights-dashboard
[ec2-user@ip .us-east-1.aws.cloud.mysql.com Please provide the password for 'root@:	.dbsystem .dbsystem.us-e
ast-1.aws.cloud.mysql.com': *******	dhevetem us-east-1 aws clou
d.mysql.com'? [Y]es/[N]o/Ne[v]er (default No): MySQL Shell 8.0.31	
Copyright (c) 2016, 2022, Oracle and/or its affiliates. Oracle is a registered trademark of Oracle Corporation and/or Other names may be trademarks of their respective owners.	r its affiliates.
Type '\help' or '\?' for help; '\quit' to exit. Creating a session to 'root@ cloud.mysql.com' Fetching schema names for auto-completion Press ^C to sto	.dbsystem.us-east-1.aws.
Your MySQL connection id is 41 (X protocol) Server version: 8.0.31-u3-cloud MySQL Enterprise - Cloud No default schema selected; type \use <schema> to set one.</schema>	



62. Now that you are logged in to the MySQL HeatWave on AWS System, it is time to load our Amazon Aurora MySQL Server data from S3 into this newly created MySQL HeatWave System. Make sure you are in the JavaScript mode of MySQL Shell by executing \js and then execute the MySQL Shell Load command

MySQL JS> \js

MySQL JS> util.loadDump("sampledump", {s3BucketName: "heatwave-s3", progressFile: "/home/ec2-user/progressfile.json", ignoreVersion:true, loadUsers:true, dryRun:true}) MySQL dump", {s3BucketName: "heatwave-s3", progressFile: "/home/ec2-user/progressfile.json", ignoreV ersion:true, loadUsers:true, dryRun:true}) Loading DDL, Data and Users from AWS S3 bucket=heatwave-s3, prefix='sampledump' using 4 thread s. Opening dump... dryRun enabled, no changes will be made. Target is MySQL 8.0.31-u3-cloud (MySQL Database Service). Dump was produced from MySQL 5.7.12 WARNING: Destination MySQL version is newer than the one where the dump was created. Loading d umps from different major MySQL versions is not fully supported and may not work. The 'ignoreV ersion' option is enabled, so loading anyway. Fetching dump data from remote location.. Listing files - done Scanning metadata – done Checking for pre-existing objects... Executing common preamble SQL Executing DDL - done Executing view DDL - done Starting data load Executing user accounts SQL... NOTE: Skipping CREATE/ALTER USER statements for user 'root'@'%' NOTE: Filtered statement with restricted grants: GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP , PROCESS, REFERENCES, INDEX, ALTER, SHOW DATABASES, CREATE TEMPORARY TABLES, LOCK TABLES, EXECUTE, REP LICATION SLAVE, REPLICATION CLIENT, CREATE VIEW, SHOW VIEW, CREATE ROUTINE, ALTER ROUTINE, CREATE US ER, EVENT, TRIGGER ON *.* TO 'rdsadmin'@'localhost' WITH GRANT OPTION; -> GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, PROCESS, REFERENCES, INDEX, ALTER, SHOW DATABASES, CREATE TEMPOR ARY TABLES, LOCK TABLES, EXECUTE, REPLICATION SLAVE, REPLICATION CLIENT, CREATE VIEW, SHOW VIE W, CREATE ROUTINE, ALTER ROUTINE, CREATE USER, EVENT, TRIGGER ON *.* TO 'rdsadmin'@'localhost' WITH GRANT OPTION; NOTE: Skipping GRANT statements for user 'root'@'%' Executing common postamble SQL 0% (0 bytes / 194.62 KB), 0.00 B/s, 3 / 3 tables done Recreating indexes - done No data loaded. 0 warnings were reported during the load. .dbsystem.us-east-1.aws JS > MySQL

- Note:
  - The util.loadDump() utility will use the DDL files and tab-separated .tsv data files to set up the server instance or schema in the target MySQL instance, then load the data. For more information, refer to: <u>https://dev.mysql.com/doc/mysql-shell/8.0/en/mysql-shell-utilities-load-dump.html</u>
  - Change the prefix and s3BucketName to match with what you have.



63. Once you have executed the command in Step 62 and did not see any errors or warnings, execute the same Step 62 command. Although, this time change the dryRun option to false

MySQL JS> util.loadDump("sampledump", {s3BucketName: "heatwave-s3",
<pre>progressFile: "/home/ec2-user/progressfile.json", ignoreVersion:true,</pre>
<pre>loadUsers:true, dryRun:false})</pre>
MySQL .dbsystem.us-east-1.aws JS > util.loadDump("samp
dump", {s3BucketName: "heatwave-s3", progressFile: "/home/ec2-user/progressfile.json", ignor
ersion:true, loadUsers:true, dryRun:false})
Loading DDL, Data and Users from AWS S3 bucket=neatwave-s3, prefix='sampledump' using 4 thre
s. Onening dump
Target is MySQL 8.0.31-u3-cloud (MySQL Database Service). Dump was produced from MySQL 5.7.1
WARNING: Destination MvSQL version is newer than the one where the dump was created. Loading
umps from different major MySQL versions is not fully supported and may not work. The 'ignor
ersion' option is enabled, so loading anyway.
Fetching dump data from remote location
Listing files - done
Scanning metadata - done
Checking for pre-existing objects
Executing common preamble SQL
Executing DDL - done
Executing view DDL - done
Starting data load
Executing user accounts SQL
NOTE: Skipping GREATE/ALTER USER statements for user 'root'@'%'
DONCES PILLETED STATEMENT WITH TESTITCTED GIANTS, GRANT SELECT, INSERT, OPDATE, DELETE, GREATE, DR DONCESS DECEDENCES THDEY ATTED SHOW DATABASES ODEATE TEMDODADY TABLES TOOK TABLES EVENITE D
ITCATION SLAVE REPLICATION CLIENT CREATE VIEW SHOW VIEW CREATE ROUTINE ALTER ROUTINE CREATE
FR. EVENT, TRIGGER ON *.* TO 'rdsadmin'@'localhost' WITH GRANT OPTION: -> GRANT SELECT, INSERT
UPDATE, DELETE, CREATE, DROP, PROCESS, REFERENCES, INDEX, ALTER, SHOW DATABASES, CREATE TEMP
ARY TABLES, LOCK TABLES, EXECUTE, REPLICATION SLAVE, REPLICATION CLIENT, CREATE VIEW, SHOW V
W, CREATE ROUTINE, ALTER ROUTINE, CREATE USER, EVENT, TRIGGER ON *.* TO 'rdsadmin'@'localhos
WITH GRANT OPTION;
NOTE: Skipping GRANT statements for user 'root'@'%'
Executing common postamble SQL
100% (194.62 KB / 194.62 KB), 0.00 B/s, 3 / 3 tables done
Recreating indexes - done
3 chunks (5.30K rows, 194.62 KB) for 3 tables in 1 schemas were loaded in 1 sec (avg through
t 194.62 KB/s)
o warnings were reported during the load.
absystem.us-east-1.aws JS >

• Note: once the load process is complete, MySQL Shell will display a summary of the dump process like the one shown in the image above.



64. After your import command has completed successfully in the previous step, you can verify the schemas and tables imported by running the following commands in \sql mode of MySQL Shell:

MÀRÔT 22> /2d1	
MySQL SQL> SHOW SCHEMAS;	
MySQL SQL> SHOW TABLES IN world;	
MySQL	
Switching to Sul mode Commands and with ;	
MySQL	
l information schema l	
mysql   mysql autopilot	
performance schema	
i world	
6 rows in set (0.0015 sec)	
MySQL	d;
+	
Tables_in_world	
++	
city	
country	
countrylanguage	
**	
3 rows in set (0.0018 sec)	
MySQL · · · dbsystem.us-east-1.aws.cloud.mysql SQL >	



#### IV. Loading data into MySQL HeatWave

#### Section K: Load data into the HeatWave Cluster

To make use of MySQL HeatWave's in-memory query engine and query acceleration capabilities, you need to attach a HeatWave cluster to your MySQL database.

65. Login to your MySQL HeatWave on AWS Console and navigate to the 'Workspaces' tab

MySQL HeatWave ORACLE	⊘
Getting Started	
MySQL Database Systems and HeatWave Clusters work toge query acceleration for your OLTP, OLAP, and ML workloads.	ther to provide high performance
	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
MVS()L Database	HeatWave
티 Introduction 님 MySQL	딸 HeatWave ML 넨 Performance

66. From the 'Workspaces' tab, click the "Connect to MySQL DB System' button and then, select your MySQL HeatWave System (in our case we will be selecting "HWonAWS")

MySQL HeatWa ORACLE	ve				0	•
Query Editor Manage Data in	HeatWave				Connect to M	ySQL DB System
Database Objects 🛈	C• «	Run Query	Clear			
Schema/Table Name	HeatWave	1				
Not connec Connect to run queries and vi	ted ew database objects					
目 Introduction 目 MySQL	. 🍪 HeatWave Clus	sters 🔳 Works	paces 딸 HeatWave N	/L 내 Performance		





MySQL HeatWave ORACLE		⊘ ►
Query Editor Manage Data in HeatWave		Connect to MySQL DB System
Database Objects	Connect to MySQL DB System	
Schema/Table Name	þelect a DB System	-
		Required
Not connected	Username	
Connect to run queries and view database		Required
	Password	
		Requirea
	Cancel	Connect
1		
Introduction HysQL 🗱 HeatW	ave Clusters 🔠 Workspaces 🛄 Performance	

North Party	
Co	onnect to MySQL DB System
S	elect a DB System 🔻
H	HWonAWS
H	HeatWave: Active
a	awstohwst
H	HeatWave: Active
ł	HWTest HeatWave: Active
r	nysql-aws-sp1
H	HeatWave: • Active
H	HeatWave-demo
H	HeatWave: ● Active



67. After selecting the appropriate MySQL DB System, enter the DB Username and Password. Click "Connect" afterwards

Connect to MySQL DB	System	
HWonAWS		•
Username root		
Password		۲
	Cancel	Connect

68. Once you connect, your MySQL DB System name alongside the username that was used to connect will be displayed on the top right. You can also view all the "Schemas" that are currently in the MySQL InnoDB Storage engine, under the "Database Objects"

MySQL HeatWave	е					racle.com 🔻
Query Editor Manage Data in He	eatWave		He	atWave Cluster Active	MySQL DB System HWonAWS	Username root Disconnee
Database Objects (i)	¢ «	Run Query Stop	Clear		Τ	T
		Dura superi				
world	0 of 3	nurra yuery				
Column Name Data Typ	e HeatWave		-			
Introduction	🎇 HeatWave Clu	sters III Workspaces	문 HeatWave ML	<u>H</u> Performa	ince	



69. On the 'Workspaces' tab, switch to "Manage Data in HeatWave" from 'Query Editor'

MySQL HeatWave ORACLE				0
Query Editor Manage Data in HeatWave		///////	HeatWave Cluster • Active	MySQL DB System Username HWonAWS root Disconn
Load into HeatWave Unload from HeatWave Refresh	Table size estimate	es last refreshed	on Thu, 26 Jan 2023 18	:34:42 GMT
Name	Loaded	Warnings	Rows Estimate	Memory Size Estimate (GiB)
vworld	0 of 3	0	5,258	0.009
city	0	-	4,035	0.003
C 🖩 country	0	-	239	0.003
C durtrylanguage	0		984	0.003
0.0 % 16.0) GiB		0.0 GiB	0.0 GiB
Cluster memory usage ① Free cluster	memory 🛈	S	ize of tables to load (i)	Size of tables to unload (i)
킔 Introduction 이 MySQL 🗱 HeatWave Clusters	Workspace	es	:Wave ML [<u>내</u> Perf	ormance

70. This screen will show a list of the schemas and tables that are loaded in the MySQL DB System. From this screen, you can select the schemas and tables to load into MySQL HeatWave's in-memory engine. Select the databases/tables you want to load by checking the box next to the appropriate database(s)/table(s). (For this guide, instead of loading the whole "world" database, we will only load the "city" table and "countrylanguage" table)

MySQL HeatWave ORACLE				0	Ţ
Query Editor Manage Data in HeatWave			HeatWave Cluster • Active	MySQL DB System Username HWonAWS root	Disconnect
Load into HeatWave Unload from HeatWave Refresh	Table size estimate	es last refreshed o	on Thu, 26 Jan 2023 18:34	4:42 GMT	,
		warnings	E 259	o ooo)
✓ III city	0	-	4,035	0.003	
C Country	0	-	239	0.003	
countrylanguage	0		984	0.003	
0.0 % 16.	0 GiB		0.0 GiB	0.0 GiE	3
Cluster memory usage ① Free cluster	er memory (j)	Siz	ze of tables to load (j)	Size of tables to un	load (j)
同 Introduction 日 MySQL 総 HeatWave Clusters	Workspace	es 딸 Heat	Wave ML	mance	



71. After you have selected all the tables you want to load into HeatWave, click the 'Load into HeatWave' button on the top left.

		006.606	
Query Editor	Manag	ge Data in HeatWave	

72. After you've clicked the 'Load into HeatWave' button, a popup will appear, which will show you information about the tables that will be loaded and how much memory HeatWave will consume. The estimated time required to load the tables into memory will also be displayed. Click "Load Tables" when the below popup appears.

ORACLE			
Query Editor Manage Data in HeatW	MySQL Autopilot Parallel L DB System Tables to load HWonAWS 2	oad tables to HeatWave Estimated load size Estimated load time 0.01 G/B 1.0 seconds	. DB System Username AWS root Disconnec
□ Name ☑ ▼ world	Schemas and tables to be loaded Name > world	Memory Size Estimate (GiB)	vory Size Estimate (GiB) 9
		Load Tables Cancel	3 3 8
0.0 %	16.0 GiB	0.0 GiB	0.0 GiB

73. You can click the 'Refresh' button to view the progress of how much data has been loaded into HeatWave. Depending on the size of your data, it may take a few minutes to complete the load.

ORACLE					
uery Editor Manage Data in HeatWa	ve		HeatWave Cluster • Active	MySQL DB System HWonAWS	Username root Disconn
Load into HeatWave Unload from Heat	tWave Refresh Table size estimate	es last refreshed	on Wed, 30 Nov 2022 17:1	15:47 GMT	
Name	Loaded	Warnings	Rows Estimate	Memory Size Est	timate (GiB)
world	2 of 3	0	5,258	0.009	
world	2 of 3	0	5,258	0.009	
birow	2 of 3	0	5,258	0.009	
□ • world	2 of 3 16.0 GiB	0	5,258 0.0 GiB	0.009	0.0 GiB

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74. To confirm if your data is 100% loaded, expand the schema by clicking the tiny arrow next to the Schema name from either the "Query Editor" or "Manage Data in HeatWave" on the 'Workspaces' tab.

MySQL HeatWave ORACLE				0	·
Query Editor Manage Data in HeatWave			HeatWave Cluster Active	MySQL DB System HWonAWS	Username root Disconnect
Load HeatWave Unload from HeatWave Refresh	Table size estimate	es last refreshed o	on Thu, 26 Jan 2023 18	:42:28 GMT	
	Loaded	Warnings	Rows Estimate	Memory Size Es	timate (GiB)
world	2 of 3	0	5,258	0.009	
□ III city	100	-	4,035	0.003	
C 🖬 country	0	-	239	0.003	
C Countrylanguage	100	-	984	0.003	
0.0 % 16.0) GiB		0.0 GiB		0.0 GiB
Cluster memory usage () Free cluster	memory (j)	Si	ze of tables to load (i)	Size o	tables to unload (i)
ー 同 Introduction 〇 MySQL 総 HeatWave Clusters	Workspace	es 竖 Heat	Wave ML ਪ੍ਰਿਪ Perf	ormance	

MySQL HeatWav ORACLE	/e		0	·
Query Editor Manage Data in F	HeatWave		HeatWave Cluster Active	Username root Disconnect
Database Objects (j)	€ «	Run Query Stop Cle	ar	
Schema/Table Name	HeatWave	1		
▼ world	2 of 3			
🖬 city	00	Run a query		
country	0			
countrylanguage				
Column Name Data Ty	pe HeatWave			
Introduction MySQL	💸 HeatWave Clu	sters 🖬 Workspaces	갈 HeatWave ML 내 Performance	

- 75. You now have a complete MySQL HeatWave cluster.
- 76. Congratulations, you've now successfully migrated your data from Amazon Aurora MySQL to MySQL HeatWave on AWS!

To learn more about using HeatWave, please visit our documentation.

V. Appendix

Section L: Performing the util.dumpInstance()and util.loadDump() utility to and from a local filesystem

- 77. For relatively small databases, you can create the dump files on your local system. Although, you need to transfer them to the AWS EC2 instance using the copy utility of your choice, depending on the operating system you chose for your EC2 instance. (MySQL Shell must be installed on the systems from where you intend to run the util.dumpInstance() and util.loadDump() utility, setting up the credentials file is not required here)
- 78. In this Section, we will showcase how to perform the dumpInstance() utility from the Amazon Aurora MySQL instance into a local filesystem. The local filesystem used for the dumpInstance() in this guide is the AWS EC2 instance that was shown in Step 11.
- 79. Connect to your Amazon Aurora MySQL Server using MySQL Shell

```
ec2-user $ mysqlsh <username>@<localhost/ip>
or
ec2-user $ mysqlsh -u <username> -h <localhost/ip> -P <portnumber> -p
[ec2-user@i
                         ~]$ mysqlsh root@database-1-i
                                                                              .us-east-1.
rds.amazonaws.com
Please provide the password for 'root@database-1-
                                                                       /.us-east-1.rds.a
mazonaws.com': *******
Save password for 'root@database-1-instance-1
                                                                   1.rds.amazonaws.com'?
 [Y]es/[N]o/Ne[v]er (default No):
MySQL Shell 8.0.31
Copyright (c) 2016, 2022, Oracle and/or its affiliates.
Oracle is a registered trademark of Oracle Corporation and/or its affiliates.
Other names may be trademarks of their respective owners.
Type '\help' or '\?' for help; '\quit' to exit.
Creating a session to 'root@database-1-instance-1.
                                                                        .rds.amazonaws.c
om'
Fetching schema names for auto-completion... Press ^C to stop.
Your MySQL connection id is 97
Server version: 5.7.12 MySQL Community Server (GPL)
No default schema selected; type \ \ schema> to set one.
MySQL database-1-instance-
                                                  -1.rds JS >
```

80. Make sure you are in JavaScript mode by typing \js and execute the dumpInstance utility to export the dump data into your local filesystem

MySQL JS> \js

MySQL JS> util.dumpInstance("/home/ec2-user/sampledump", {"ocimds": "true", "compatibility": ["strip restricted grants", "strip definers"], users: "true", dryRun:"true", consistent: "false"}) MySQL database-1.0 east-1.rds.amazonaws<mark> JS</mark> > util.dumpInstance("/home/ ec2-user/sampledump", {"ocimds": "true", "compatibility": ["strip_restricted_grants", "strip_d efiners"], users: "true", dryRun:"true", consistent: "false"}) dryRun enabled, no locks will be acquired and no files will be created. Initializing - done 0 out of 4 schemas will be dumped and within them 0 tables, 0 views. 2 out of 3 users will be dumped. Gathering information - done WARNING: The dumped value of gtid_executed is not guaranteed to be consistent Checking for compatibility with MySQL Database Service 8.0.31 NOTE: MySQL Server 5.7 detected, please consider upgrading to 8.0 first. Checking for potential upgrade issues. The MySQL server at database-1. east-1.rds.amazonaws.com:3306, version 5.7.12 – MySQL Community Server (GPL), will now be checked for compatibility issues for upgrade to MySQL 8.0.31... 1) MySQL 8.0 syntax check for routine-like objects 16) Check for invalid table names and schema names used in 5.7 No issues found Errors: 0 Warnings: 1 Notices: 0 NOTE: No fatal errors were found that would prevent an upgrade, but some potential issues were detected. Please ensure that the reported issues are not significant before upgrading. NOTE: User 'rdsadmin'@'localhost' had restricted privileges (CREATE TABLESPACE, FILE, RELOAD, SHUTDOWN, SUPER) removed NOTE: User 'root'@'%' had restricted privileges (INVOKE COMPREHEND, INVOKE LAMBDA, INVOKE SAGE MAKER, LOAD FROM S3, RELOAD, SELECT INTO S3) removed Compatibility issues with MySQL Database Service 8.0.31 were found and repaired. Please review the changes made before loading them. Validating MDS compatibility - done Writing global DDL files Writing users DDL Writing DDL - done Starting data dump 0% (0 rows / ~5.30K_rows), 0.00 rows/s, 0.00 B/s uncompressed, 0.00 B/s compressed MySQL database-1. -east-1.rds world JS >

Note:

- dumpInstance SYNTAX: util.dumpInstance(outputUrl[, options])
- /home/opc/sampledump is the outputUrl. Here, you can specify an absolute path or a path relative to the current working directory for your local filesystem.
- sampledump is the directory under which all the exported dump files will be stored in EC2. The sampledump directory must not exist or if it does, the directory should be empty
- Add the consistent: false option, if and only if, your dump utility produces "Errors" regarding "table locks" (MySQLSH 52002: See Steps 47/48 for more information)
- The util.dumpInstance() utility will take a dump of all the databases except "mysql, sys, performance schema, and information schema". The dump comprises of DDL files for the schema

structure and tab-separated .tsv files containing the actual data. Additionally, you can also use util.dumpSchemas() or util.dumpTables() if you only want to dump specific schemas or tables. The three dump utilities can export the data into:

- a) Object Storage bucket in Oracle Cloud
- b) S3-compatible buckets
- c) local filesystem
- This Section showcases option c). For more information, refer: <u>https://dev.mysql.com/doc/mysql-shell-utilities-dump-instance-schema.html#mysql-shell-utilities-dump-opt-run</u>
- The dryRun option runs the export command but does not generate any output export file. It displays information about what would be dumped with the specified set of options, and about the results of MySQL HeatWave compatibility checks (if the ocimds option is specified, which is required for this guide), but does not proceed with the dump. Setting this option enables you to list out all the compatibility issues before starting the dump. The default is false. You can read more about the utility options at https://dev.mysql.com/doc/mysql-shell/8.0/en/mysql-shell-utilities-dump-instance-schema.html#mysql-shell-utilities-dump-opt-control
- Setting the ocimds: true option ensures compatibility of the export dump with MySQL HeatWave.
- Primary keys are required on every table for using MySQL HeatWave.
- If you can't seem to solve an error during the dryRun, contact a MySQL Solution Engineer for guidance: <u>https://go.oracle.com/LP=132857?src1=:ow:o:s:po:::&intcmp=:ow:o:s:po</u>:::
- To understand the dumpInstance(), dumpSchemas(), or dumpTables() utility in more detail, refer to this website: <u>https://dev.mysql.com/doc/mysql-shell/8.0/en/mysql-shell-utilities-dump-instance-schema.html</u>



81. Once you have executed the command in Step 80 and did not see any additional errors or warnings, execute the same Step 80 command. Although, this time change the dryRun option to false

the same step of command. Although, this time change the arytan option to fuse
<pre>MySQL JS> util.dumpInstance("/home/ec2-user/sampledump", {"ocimds": "true",</pre>
"compatibility": ["strip restricted grants", "strip definers"], users:
"true", dryRun:"false", consistent: "false"})
MySQL database
-user/sampledump", {"ocimds": "true", "compatibility": ["strip_restricted_grants", "strip_defi
ners"], users: "true", dryRun:"false", consistent: "false"})
Initializing - done
1 out of 5 schemas will be dumped and within them 3 tables, 0 views.
2 out of 3 users will be dumped.
WARNING: The dummed value of stid executed is not supranteed to be consistent
Checking for compatibility with MySQL Database Service 8.0.31
NOTE: MySQL Server 5.7 detected, please consider upgrading to 8.0 first.
Checking for potential upgrade issues.
The MySQL server at
database-1east-1.rds.amazonaws.com:3306, version
5.7.12 - MySQL Community Server (GPL), will now be checked for compatibility
issues for upgrade to MySQL 8.0.31
1) MySQL 8.0 syntax check for routine-like objects
NOTE: Progress information uses estimated values and may not be accurate.
Writing schema metadata – done
Writing DDL - done
Writing table metadata - done
starting data dump
100% (5.30K rows / ~5.30K rows), 0.00 rows/s, 0.00 B/s uncompressed, 0.00 B/s compressed
Scharze duration, 10,00,005
Tables dumped: 3
Incompressed data size: 196.62 KB
Compressed data size: 174.02 KB
Compression ratio: 2.1
Rows written: 5302
Bytes written: 91.71 KB
Average uncompressed throughput: 194.62 KB/s
Average compressed throughout: 91 71 KB/s

- Note: once the dump process is complete, MySQL Shell will display a summary of the dump process like the one shown in the above image.
- 82. Go back to your local filesystem and locate the dump files under the sampledump directory, to confirm if the dump was successful (in our case, the EC2 instance).

[ec2-user@ir	~]\$	
[ec2-user@ip	~]\$ ls	
mysql-shell-8.0.31-1.el8.	x86_64.rpm privapikey.pem <pre>sampledump</pre>	world-db world-db.zip
[ec2-user@ip-	~]\$	
[ec2-user@ip-	~]\$ cd sampledump	
[ec2-user@ip-	sampledump]\$	
[ec2-user@ip-	sampledump]\$ ls	
@.done.json	world@city.json	world@countrylanguage.json
@.json	world@city.sql	world@countrylanguage.sql
@.post.sql	world@country@@0.tsv.zst	world@country.sql
@.sql	world@country@@0.tsv.zst.idx	world.json
@.users.sql	world@country.json	world.sql
world@city@@0.tsv.zst	world@countrylanguage@@0.tsv.zst	
world@city@@0.tsv.zst.idx	world@countr <u>y</u> language@@0.tsv.zst.idx	
[ec2-user@ip-	sampledump]\$	

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- 83. Now, transfer the sampledump directory to the AWS EC2 instance using the copy utility of your choice, depending on the operating system you chose for your EC2 instance. One way to do this is to use the scp command.
- 84. After you have copied over your sampledump directory to the AWS EC2 instance, login to that EC2 instance and retrieve the path to the sampledump directory.



- Note: by looking at the above image, the sampledump directory location for this guide will hence be /home/ec2-user/sampledump
- 85. Make sure you are logged in to that EC2 instance, and then login to your MySQL HeatWave instance using MySQL Shell to load those dump files.

ssh -i <path to="" you-private-ssh-key=""> ec2-user@<ec2-public-dns></ec2-public-dns></path>
then:
<pre>\$ mysqlsh <username>@<hostname></hostname></username></pre>
Or
\$ mysqlsh -u <username> -h <hostname> -P <portnumber> -p</portnumber></hostname></username>
rmac ~ % ssh -i id_rsa ec2-user@ .compute-1.amazonaws. com Register this system with Red Hat Insights: insights-clientregister Create an account or view all your systems at https://red.ht/insights-dashboard Last login: Thu Jan 26 18:02:59 2023 from [ec2-user@ip
Save password for 'root@ .dbsystem.us-east-1.aws.clou
MySQL Shell 8.0.31
Copyright (c) 2016, 2022, Oracle and/or its affiliates. Oracle is a registered trademark of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners.
Type '\help' or '\?' for help; '\quit' to exit. Creating a session to 'root@ .dbsystem.us-east-1.aws. cloud.mysql.com' Fetching schema names for auto-completion Press ^C to stop. Your MySQL connection id is 41 (X protocol) Server version: 8.0.31-u3-cloud MySQL Enterprise - Cloud No default schema selected; type \use <schema> to set one. MySQL .dbsystem JS ></schema>

86. It is now time to load our sample database "world", that was dumped from our Amazon Aurora MySQL instance to the local filesystem, which we later transferred to the AWS EC2 instance using the copy utility of your choice. Inside MySQL Shell, make sure you are in JavaScript mode of MySQL Shell by executing \js and then, execute the loaddump utility to import the dumped data from AWS EC2 instance into MySQL HeatWave.

MySQL SQL> \js

MySQL JS> util.loadDump("/home/ec2-user/sampledump", {progressFile: "/home/ec2-user/progressfile.json", ignoreVersion: "true", loadUsers: "true", dryRun: "true"}) MySQL .dbsystem.us-east-1.aws<mark> JS</mark> > util.loadDump("/home/ ec2-user/sampledump", {progressFile: "/home/ec2-user/progressfile.json", ignoreVersion: "true" , loadUsers: "true", dryRun: "true"}) Loading DDL, Data and Users from '/home/ec2-user/sampledump' using 4 threads. Opening dump... dryRun enabled, no changes will be made. Target is MySQL 8.0.31-u3-cloud (MySQL Database Service). Dump was produced from MySQL 5.7.12 WARNING: Destination MySQL version is newer than the one where the dump was created. Loading d umps from different major MySQL versions is not fully supported and may not work. The 'ignoreV ersion' option is enabled, so loading anyway. Scanning metadata – done Checking for pre-existing objects... Executing common preamble SQL Executing DDL - done Executing view DDL - done Starting data load Executing user accounts SQL... NOTE: Skipping CREATE/ALTER USER statements for user 'root'@'%' NOTE: Filtered statement with restricted grants: GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP , PROCESS, REFERENCES, INDEX, ALTER, SHOW DATABASES, CREATE TEMPORARY TABLES, LOCK TABLES, EXECUTE, REP LICATION SLAVE, REPLICATION CLIENT, CREATE VIEW, SHOW VIEW, CREATE ROUTINE, ALTER ROUTINE, CREATE US ER,EVENT,TRIGGER ON *.* TO 'rdsadmin'@'localhost' WITH GRANT OPTION; -> GRANT SELECT, INSERT, UPDATE, DELETE, CREATE, DROP, PROCESS, REFERENCES, INDEX, ALTER, SHOW DATABASES, CREATE TEMPOR ARY TABLES, LOCK TABLES, EXECUTE, REPLICATION SLAVE, REPLICATION CLIENT, CREATE VIEW, SHOW VIE W, CREATE ROUTINE, ALTER ROUTINE, CREATE USER, EVENT, TRIGGER ON *.* TO 'rdsadmin'@'localhost' WITH GRANT OPTION; NOTE: Skipping GRANT statements for user 'root'@'%' Executing common postamble SQL 0% (0 bytes / 194.62 KB), 0.00 B/s, 3 / 3 tables done Recreating indexes - done No data loaded. 0 warnings were reported during the load. MySQL

Note:

- loadDump SYNTAX: util.loadDump(url[, options])
- /home/opc/sampledump is the url. Here, you can specify the path to a local directory containing the dump files
- The util.loadDump() utility will use the DDL files and tab-separated .tsv data files to set up the server instance or schema in the target MySQL instance, then loads the data. For more information, refer to: <u>https://dev.mysql.com/doc/mysql-shell/8.0/en/mysql-shell-utilities-load-dump.html</u>
- Change the filesystem path to match with what you have.



87. Once you have executed the command in Step 86 and did not see any errors or warnings, execute the same Step 86 command. Although, this time change the dryRun option to false



- Note: once the load process is complete, MySQL Shell will display a summary of the dump process like the one shown in the image above.
- 88. After your import command has completed successfully in the previous step, you can verify the schemas and tables imported by running the following commands in \sql mode:



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