Amazon Aurora Serverless for MySQL Lab

This hands-on lab manual will cover following tasks and procedure:

- ✓ Create and configure a new Aurora Serverless DB cluster
- Create a Cloud9 client environment and then enable network traffic to the Aurora Serverless cluster from your Cloud9 environment
- ✓ Setup sysbench on the Cloud9 environment and run load test using the provided script
- ✓ Clean up and terminate your Cloud9 environment and Aurora Serverless DB cluster

Note:

AWS Region: Use AWS region (us-west-2) to perform all activities in this Lab.

Create and configure a new Aurora Serverless DB cluster

- 1. Sign in to the AWS Management Console and open the Amazon RDS console at https://console.aws.amazon.com/rds/.
- 2. In the top-right corner of the AWS Management Console, select US West (Oregon) region.
- 3. In the navigation pane, choose **Clusters**.
- 4. Choose **Create database** to start the Create database wizard. The wizard opens on the **Select engine** page.
- 5. On the **Select Engine** page, choose Amazon Aurora under Engine Options and then choose MySQL 5.6-compatible edition of Aurora. Currently, only the MySQL 5.6 version is available with Aurora Serverless.



6. Choose Next.

- 7. On the **Specify DB details** screen, under **Capacity** type select the **Serverless** radio button.
- 8. In the **Setting** pane, enter the following:

DB cluster identifier Master username Master password	<i>aurora-sl-lab</i> master Test1234							
pecify DB details								
Configuration Estimate your monthly costs for the D8 Instance using the AW5 5	imple Monthly Calculator 🛃							
DB engine Aurora - compatible with MySQL 5.6.10a Capacity type Info Provision and manage the server instance sizes. Provision and manage the server instance sizes, and Aurora improves the performance of analytic queries by pushing processing down to the Aurora parallel query enabled Info You provision and manage the server instance sizes, and Aurora improves the performance of analytic queries by pushing processing down to the Aurora parallel query enabled Info You provision and manage the server instance sizes, and Aurora improves the performance of analytic queries by pushing processing down to the Aurora storage layer (currently available for Aurora MySQL 5.6) Serveness Info You seecify the minit um and maximum of resources for a DB cluster. Aurora scales the capacity based on database load (currently available for Aurora MySQL 5.6). Bettings DB cluster identifier Type a name for your DB cluster. The name must be unique across all DB clusters owned by your AWS account in the current AWS Region The DB cluster identifier Type a name for your DB cluster. The name must be unique across all DB clusters owned by your AWS account in the current AWS Region The DB cluster identifier is a case-sensitive, but is stored as all lowercase[as in "mydbcluster"). Constraints: 1 to 60 alphanumeric characters or hyphens [1 to 15 for SQL Server). First character must be a letter. Carit contain two consecutive hyphens. Carit edit with a hyphen. Most region is a case-sensitive, but is stored as all lowercase[as in "mydbcluster"). Constraints: 1 to 60 alphanumeric distrates or hyphens [1 to 15 for SQL Server). First character must be a letter. Carit contain two consecutive hyphens. Carit edit with a hyphen.								
Master password Info	Confirm password Info							
Master Password must be at least eight characters long, as in "mypassword". Can be any printable ASCII character except "/", "", or "@".								
	Cancel Previous Next							

- 9. Choose Next.
- 10. On the **Configure advanced settings** page, in the **Capacity setting** pane enter the following:

Minimum Aurora capacity unit	2
Maximum Aurora capacity unit	16

Expand the Additional scaling configuration section.

By default, your cluster will pause after 5 consecutive minutes of inactivity. Leave it at the default value for this lab.

Configure advanced settings	
Capacity settings Billing estimate is based on published prices. Learn more	
Minimum Aurora capacity unit Info 2 4GB RAM	Maximum Aurora capacity unit Info 16 32GB RAM
 Additional scaling configuration Pause compute capacity after consecutive minutes of You are only charged for database storage while the compute 	inactivity Info capacity is paused
00 v hours 05 v minutes	00 v seconds

11. On the Network & Security pane, in the Virtual Private Cloud (VPC) list, choose Default VPC.
 In the Subnet group list, select *Create new DB Subnet Group*.
 In VPC security groups list, select *Create new VPC security group*.

Virtual Private Cloud (VPC) Info VPC defines the virtual networking environment for this DB instance. Default VPC Only VPCs with a corresponding DB subnet group are listed.						
Subnet group Info DB subnet group that defines which subnets and IP ranges the DB instance can use in the VPC you selected. default						
VPC security groups Security groups have rules authorizing connections from all the EC2 instances and devices that need to access the DB instance. C Create new VPC security group C Choose existing VPC security groups						

- 12. Leave the settings in the additional configuration pane at its default value.
- 13. Uncheck the **Enable deletion protection** option in the **Deletion protection** pane for this lab.

► Additional configuration
Deletion protection
Enable deletion protection Protects the database from being deleted accidentally. While this option is enabled, you can't delete the database.
Cancel Previous Create database

- 14. Select Create database.
- 15. The **RDS** > **Clusters** screen will load and your *aurora-sl-lab* cluster will appear as in the creating status. Click on *aurora-sl-lab* in the cluster list to access detailed information about your cluster.

Amazon RDS	×	 Creating DB cluster "aurora-sl-lab". <u>View DB cluster</u>, 											>
Dashboard		RDS > Clusters											
Instances Clusters		Clusters (1)							C	Actions 1	Create datab	ase	
Performance Insights		Q Filter clusters									< 1 >	۲	
Snapshots Reserved instances		DB cluster identifier	Engine	*	Engine version	*	Status	Ŧ	Туре	*	Maintenance		
Subnet groups		O aurora-sl-lab	Aurora MySQL		5.6.10a		(a) creating		serverles	s	none		
Parameter groups													
Option groups													
Events													
Event subscriptions													
Recommendations													

16. The *aurora-sl-lab* detail screen will load. This screen contains monitoring information including the **Serverless Database Capacity** graph that shows the number of Aurora Capacity Units in use over time and **Recent Events** pane, which details scaling and pausing/resume events.

Scroll to the to the **Details** pane. Record the **VPC** value and **Database endpoint** values for use later in the lab.

Create a Cloud9 client environment

After creating the *aurora-sl-lab* cluster, your next task is to create a database client inside the same VPC. To complete this task, you will create a Cloud9 environment to use as your database client.

1. From the top **AWS Web Console** menu, select **Services**. In the search bar, begin typing *Cloud9* and select *Cloud9* to open the service console.

aws	Services 4	^	Resource Groups 👻 🔦			¢	BurnerConsoleAccessCile	etale.
History			cloud9					
Console Home			Cloud					
ElastiCache			A Cloud IDE for Writing, Running, and	Debugging Code				
EC2			EC2	CodeStar			Athena	
RDS			Lightsail 🖸	CodeCom	mit		EMR	
01			Elastic Container Service	CodeBuild			CloudSearch	
Cionga			EKS	CodeDeplo	ру		Elasticsearch Service	
VPC			Lambda	CodePipel	ine		Kinesis	
			Batch	Cloud9			QuickSiaht 🗷	6

- 2. In the top-right corner of the AWS Management Console, select US West (Oregon) region.
- 3. On the AWS Cloud9 screen, select Create environment.



4. On the Name environment screen, in the Name field type AuroraSLclient and select Next step.

AWS Cloud9 > Env	ironments > Create environment
Name environment	Name environment
Step 2 Configure settings	Environment name and description
Step 3 Review	Name The name needs to be unique per user. You can update it at any time in your environment settings. Lumit 60 characters Description - Optional This will appear on your environments card in your dashboard. You can update it at any time in your environment settings. Write a short description for your environment
	Limit: 200 characters
	Cancel Next step

5. On the **Configure setting** screen, leave the environment type as *Create a new instance for environment (EC2)* and the **Instance type** as *t2.micro*. Leave the **cost-saving setting** at its default value.

Environment settings Environment type Info Create a new instance for environment (EC2) Teache a new instance for environment (EC2) Teacher eligible, ideal for educational upers and exploration. Teacher eligible, ideal for education and general-purpose development. Teacher eligible idea instance type. Teano </th <th>on</th> <th>figure settings</th>	on	figure settings
Environment type Info Choose between creating a new EC2 instance for your new environment or connecting directly to your server over SSH. Create a new instance for environment (EC2) Towach a new instance for environment (EC2) Towach a new instance to this region to new your own invironment. Connect and run in remote server (SSH) Display instructions to connect remotely over SSH and run your new environment. Instance type It 2.micro (1 GiB RAM + 1 vCPU) Recommended for small-sized web projects. mtl.large (8 GiB RAM + 2 vCPU) Recommended for production and general-purpose development. Other instance type. t2.nano Cost-saving setting Mathemation settings of half an hour of no activity to maximize savings. After 30 minutes (default) Why Scloud9 creates a service-linked role for you. This allows AWS Cloud9 to call other AWS services on your behalf. You can delete the role from the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more Compared and the role for the and sole once you no longer have any AWS Cloud9 environments. Learn more Compared and the role for the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more Compared and the role for AWS Cloud9 environments. Learn more Compared and the role for the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more Compared and the role for the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more Compared and the role for the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more Compared and the role forom the A	Env	vironment settings
Instance type Instance type Carbon Constrained Provide Provi	Envi Choo	ironment type Info see between creating a new EC2 instance for your new environment or connecting directly to your server over SSH. Create a new instance for environment (EC2) Laurch a new instance in this region to any your new invironment. Connect and run in remote server (SSH) Display instructions to connect remotely over SSH and run your new environment.
 t2.small (2 GiB RAM + 1 vCPU) Recommended for small-sized web projects. m4.large (8 GiB RAM + 2 vCPU) Recommended for production and general-purpose development. Other instance type Select an instance type. t2.nano t2.nano Cost-saving setting Chose a predetermined amount of time to auto-hibernate your environment and prevent unnecessary charges. We recommend a hibernation settings of half an hour of no activity to maximize savings. After 30 minutes (default) IAM role AWS Cloud9 creates a service-linked role for you. This allows AWS Cloud9 to call other AWS services on your behalf. You can delete the role from the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more AMSServiceRoleForAWSCloud9 	Insta	ance type t2.micro (1 GiB RAM + 1 vCPU) Free-tier eligible. Ideal for educational users and exploration.
Networkshow of production and general purpose detempinents Other instance type Select an instance type. t2.nano Cost-saving setting Choose a predetermined amount of time to auto-hibernate your environment and prevent unnecessary charges. We recommend a hibernation settings of half an hour of no activity to maximize savings. After 30 minutes (default) VM role AWS Cloud9 creates a service-linked role for you. This allows AWS Cloud9 to call other AWS services on your behalf. You can delete the role from the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more Common Context and the area of the ar	0	t2.small (2 GIB KAM + 1 VCPU) Recommended for small-sized web projects. m4.large (8 GIB RAM + 2 vCPU) Recommended for production and general-ourness development
t2.nano	0	Other instance type Select an instance type.
Cost-saving setting Choose a predetermined amount of time to auto-hibernate your environment and prevent unnecessary charges. We recommend a hibernation settings of half an hour of no activity to maximize savings. After 30 minutes (default) IAM role AWS Cloud9 creates a service-linked role for you. This allows AWS Cloud9 to call other AWS services on your behalf. You can delete the role from the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more AWSServiceRoleForAWSCloud9		t2.nano 🔻
After 30 minutes (default)	Cost Choo a hib	t-saving setting use a predetermined amount of time to auto-hibernate your environment and prevent unnecessary charges. We recommend ernation settings of half an hour of no activity to maximize savings.
IAM role AWS Cloud9 creates a service-linked role for you. This allows AWS Cloud9 to call other AWS services on your behalf. You can delete the role from the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more AWSServiceRoleForAWSCloud9	Af	ter 30 minutes (default)
AWSServiceRoleForAWSCloud9	IAM AWS delet	role Cloud9 creates a service-linked role for you. This allows AWS Cloud9 to call other AWS services on your behalf. You can te the role from the AWS IAM console once you no longer have any AWS Cloud9 environments. Learn more 🔀
	AV	WSServiceRoleForAWSCloud9

6. Because Aurora Serverless DB clusters do not have publically accessible endpoints, your *aurorasl-lab* can only be accessed from within the same VPC.

To place *AuroraSLclient* in the same VPC as *aurora-sl-lab*, scroll down the **Configure setting** screen and expand the **Network settings (advanced)** section. From the **Network (VPC)** drop down, select *aurora-sl-lab*'s VPC which you recorded in step 16 above.

Select Next step.

Private Cloud (VPC) or create a new	one.
▼ C	Create new VPC
ability Zone)	Create new subnet
	Private Cloud (VPC) or create a new C LEC2 resources from each other. ability Zone)

7. On the **Review** page, select **Create environment**.

After your new Cloud9 environment has been created, proceed to the next step.

Enable client network access to your Aurora Serverless Cluster

In this step, you will enable network access from your Cloud9 environment to your Serverless DB Cluster. To accomplish this task, you will add the security group assigned to *AuroraSLclient* as a traffic source for the security group assigned to *aurora-sl-lab*. A security group is a virtual firewall that controls network traffic in your network.

- 1. Open the AWS Cloud9 Console at https://console.aws.amazon.com/cloud9/.
- 2. In the top-right corner of the AWS Management Console, select US West (Oregon) region.
- 3. Select *AuroraSLClient* and Choose View Details.

AWS Cloud9 > Your environments			
Your environments (1)		Open IDE 🖸 View details E	dit Delete Create environment
			< 1 > 🐵
AuroraSLclient O]		
Type Permissions EC2 Owner Description No description was provided			
Open IDE			

4. Record the security group under **Security Groups** for use later in the lab.

WS Cloud9 > Environments > AuronsSt.client							
AuroraSLclient	Open IDE 🖾 Edit Delete						
Environment details							
Name AuroraSLClient Description No description provided Type EC2 Permissions Owner	EC2 Instance type t2.micro Memory 1 GiB VCPU Storage EBS only	Security groups 95 VPC vpc subnet subnet Environment path /home/ec2-use/environment	Environment ABN annaws:doud9as- west 2 Number of members 1				

- 5. Open the Amazon RDS console at <u>https://console.aws.amazon.com/rds/</u>.
- 6. In the top-right corner of the AWS Management Console, select US West (Oregon) region.
- 7. In the navigation pane, choose **Clusters**.
- 8. Click on *aurora-sl-lab* in the cluster list.
- 9. Scroll to the **Details** pane and click on the security group listed under **Security groups**.

Details			
Configuration	Capacity settings	Security and network	Backups
ARN	Minimum Aurora capacity unit	VPC	Automated backups
arn:aws:rds:us-west-2 000 arn:aws: cluster:aurora- sl-lab	2 capacity units	vpc-	Enabled (1 Day)
	Maximum Aurora capacity unit	Subnet group	Earliest restorable time
DB cluster	16 capacity units	default	Mon Oct 22 16:27:47 GMT-700 2018
aurora-sl-lab	Pause compute capacity after consecutive minutes of	Subnets	Latest restore time
Port	inactivity	subnet-	Mon Oct 22 16:34:06 GMT-700 2018
3306	5 minutes	subnet-	Rackup window
Status		Sublec	08:22-08:52 UTC (GMT)
available		Security groups	
		Security Group sg-	Maintenance window
default aurora 5.6		(active)	mon:07:49-mon:08:19 UTC (GMT)
default.autorab.o		Database endpoint	
Resource ID		aurora-sl-lab.cluster-us-	
cluster-		west-2.rds.amazonaws.com	
IAM DB Authentication Enabled No			
Deletion protection Disabled			

10. Choose Inbound Rules.

11. Choose Edit.

	Create	Security	Group	ons v							▲ ⊙ ♦	0
	Q, se	earch : sg-	f98	3 💿 Add filter								>
	N	lame	- Group ID	~	Group Name	▲ VPC I	D	- Description		•		
			sg-	f98	rds-launch-wizard-3	vpc-		Created from the RDS Mana	agement Console: 2018/10/22 23:	26:54		
	Securit	y Group: :	sg.	f98	-							
1	Descri	iption	Inbound	utbound Tags								
	Edit	:										
	Туре	• (i)			Protocol (i)		Port Range (i)		Source (i)	Description	(i)	
	MYS	QL/Aurora			тср		3306					

12. In the Inbound Rules tab, select Add another rule.

In the **Type** column, select **MySQL/Aurora (3306)** from the drop down list. In the **Source** column, paste the security group of *AuroraSLclient* which you recorded at step 4 above.

Then select Save.

Edit inbound	rules					×
Type (i)	Protocol (i)	Port Range ()	Source (i)		Description (i)	
MYSQL/Auror; ~	TCP	3306	Custom ~	(32	e.g. SSH for Admin Desktop	⊗
MYSQL/Auror; ~	TCP	3306	Custom ~ sg-	f95	e.g. SSH for Admin Desktop	\otimes
Add Rule NOTE: Any edits may on that rule to be dro	de on existing rules opped for a very brie	will result in the edited	rule being deleted and a new e new rule can be created.	rule created with the n	ew details. This will cause traffic that dependent	ds
					Cance	Save

Setup sysbench on the Cloud9 environment and run load test

- 1. Open the AWS Cloud9 Console at https://console.aws.amazon.com/cloud9/.
- 2. In the top-right corner of the AWS Management Console, select US West (Oregon) region.
- 3. Select AuroraSLClient and Choose Open IDE.
- 4. Click the + sign and then choose **New Terminal**.



5. Copy and paste the following commands on the terminal window to install sysbench.

sudo yum -y install bzr;sudo yum -y install automake;sudo yum -y install libtool;sudo yum -y install mysql-devel;sudo bzr branch lp:sysbench;cd sysbench;sudo ./autogen.sh;sudo ./configure;sudo make; cd sysbench

Note: Use Ctrl+V on windows or Command+V on mac to paste on Cloud9 terminal window.

6. Connect to *aurora-sl-lab* cluster using the following command. Substitute your database endpoint for the value in the command and press Enter.

mysql --user=master --password=Test1234 -h <your database endpoint>

You should now be connected to the aurora-sl-lab Aurora Serverless DB cluster!

7. Create a database to store sysbench related tables.

```
mysql> create database sysbench;
Query OK, 1 row affected (0.01 sec)
mysql> exit
```

8. Create a load test shell script using the following commands.

cat > /home/ec2-user/environment/loadtest.sh <<EOF</pre>

```
/home/ec2-user/environment/sysbench/sysbench/sysbench --test=/home/ec2-
user/environment/sysbench/sysbench/tests/db/oltp.lua --mysql-host=aurora-sl-
lab.cluster-czrxjzwto2u8.us-west-2.rds.amazonaws.com --mysql-port=3306 --
mysql-user=master --mysql-password=Test1234 --mysql-db=sysbench --mysql-
table-engine=innodb --oltp-table-size=25000 --oltp-tables-count=250 --db-
driver=mysql prepare
nohup /home/ec2-user/environment/sysbench/sysbench/sysbench --
test=/home/ec2-user/environment/sysbench/sysbench/tests/db/oltp.lua --mysql-
host=aurora-sl-lab.cluster-czrxjzwto2u8.us-west-2.rds.amazonaws.com --oltp-
tables-count=250 --mysql-user=master --mysql-password=Test1234 --mysql-
port=3306 --db-driver=mysql --oltp-tablesize=25000 --mysql-db=sysbench --
max-requests=0 --oltp simple ranges=0 --oltp-distinct-ranges=0 --oltp-sum-
ranges=0 --oltp-order-ranges=0 --max-time=300 --oltp-read-only=on --num-
threads=80 run > /home/ec2-user/environment/loadtest.out 2>&1 &
sleep 400
nohup /home/ec2-user/environment/sysbench/sysbench/sysbench --
test=/home/ec2-user/environment/sysbench/sysbench/tests/db/oltp.lua --mysgl-
host=aurora-sl-lab.cluster-czrxjzwto2u8.us-west-2.rds.amazonaws.com --oltp-
tables-count=250 --mysql-user=master --mysql-password=Test1234 --mysql-
port=3306 --db-driver=mysql --oltp-tablesize=25000 --mysql-db=sysbench --
max-requests=0 --oltp simple ranges=0 --oltp-distinct-ranges=0 --oltp-sum-
ranges=0 --oltp-order-ranges=0 --max-time=1200 --oltp-read-only=on --num-
threads=40 run >> /home/ec2-user/environment/loadtest.out 2>&1 &
EOF
```

chmod 755 /home/ec2-user/environment/loadtest.sh

9. Run load test bash script.

/home/ec2-user/environment/loadtest.sh

This will setup the sysbench related tables.

Then it will start a sysbench read heavy load test using 80 threads, which will run for 5 minutes. Later another sysbench read heavy load test will start using 40 threads, which will run for 20 minutes.

Tail the log file to view the progress.

tail -100f /home/ec2-user/environment/loadtest.out

10. When the load test is running, you can observe the cloudwatch metrics for *aurora-sl-lab* cluster under **CloudWatch** pane.



You can also view the scale up/down events and pause events under Recent Events pane.

Recent events (18) Q. Filter db events		(1 > (0)
Time v	System notes	*
Mon Oct 22 21:00:57 GMT-700 2018	The DB cluster is paused.	
Mon Oct 22 21:00:49 GMT-700 2018	The DB cluster is being paused.	
Mon Oct 22 20:24:51 GMT-700 2018	The DB cluster has scaled from 4 capacity units to 2 capacity units.	
Mon Oct 22 20:24:38 GMT-700 2018	Scaling DB cluster from 4 capacity units to 2 capacity units for this reason: Autoscaling.	
Mon Oct 22 20:08:08 GMT-700 2018	The DB cluster has scaled from 8 capacity units to 4 capacity units.	
Mon Oct 22 20:07:27 GMT-700 2018	Scaling DB cluster from 8 capacity units to 4 capacity units for this reason: Autoscaling.	
Mon Oct 22 19:40:53 GMT-700 2018	The DB cluster has scaled from 4 capacity units to 8 capacity units.	
Mon Oct 22 19:40:47 GMT-700 2018	Scaling DB cluster from 4 capacity units to 8 capacity units for this reason: Autoscaling.	
Mon Oct 22 19:20:12 GMT-700 2018	The DB cluster is resumed.	
Mon Oct 22 19:19:44 GMT-700 2018	The DB cluster is being resumed.	
Mon Oct 22 18:48:05 GMT-700 2018	The DB cluster is paused.	

Terminate Resources

- 1. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
- 2. In the top-right corner of the AWS Management Console, select US West (Oregon) region.
- 3. In the navigation pane, choose **Clusters**.
- 4. Click on *aurora-sl-lab* in the cluster list.
- 5. Scroll to the **Details** pane and click on the security group listed under **Security groups**.
- 6. Choose Inbound Rules.
- 7. Choose Edit.
- 8. **Delete** the security group for *AuroraSLclient* which you had added earlier. Then select **Save**.

ype (i)	Protocol (i)	Port Range (i)	Source (i)	Description (i)
MYSQL/Auror; ~	TCP	3306	Custom V 32	e.g. SSH for Admin Desktop
MYSQL/Auror; ~	TCP	3306	Custom V sg-	e.g. SSH for Admin Desktop

Cancel Save

- 9. Open the Amazon RDS console at https://console.aws.amazon.com/rds/.
- 10. In the top-right corner of the AWS Management Console, select US West (Oregon) region.
- 11. In the navigation pane, choose **Clusters**.
- 12. Click on *aurora-sl-lab* in the cluster list.
- 13. From the Actions menu select Delete Cluster.

RDS > Clusters									
Clusters (1)						C	Actions 🔻	Create databa	ise
Q Filter clusters							Modify cluster	$\langle 1 \rangle$	۲
							Set capacity		
DB cluster identifier	•	Engine	Engine version	•	Status	Туре	Take snapshot	intenance	
• aurora-sl-lab		Aurora MySQL	5.6.10a		🛛 available	serverī	Delete cluster	īne	

- 14. Choose **No** for **Create final snapshot** Option, check the acknowledgement box and select **Delete Cluster.**
- 15. Open the AWS Cloud9 Console at https://console.aws.amazon.com/cloud9/.
- 16. In the top-right corner of the AWS Management Console, select US West (Oregon) region.
- 17. From the **Your environments** screen, select *AuroraSLClient* and select **Delete**. Confirm the *AuroraSLClient* deletion.

