Rdstools

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9/24/2023

Rdstools

- RdsDiscovery (RdsDTool)
  - RDS limitation discovery
  - Elasticache Assessment
- SQL Server Assessment (SSAT)
  - Collection of metrics (MEM,CPU,IOPS)
  - Assessment and right Sizing
  - Elasticache Assessment

- Total Cost of ownership(TCO)-coming Soon

Discovery Template

L100	
	Question
1	Where is the current SQL Server workload running on, OnPrem, EC2, or another Cloud?
2	Do you currently own any SQL Server licenses that you could bring to the Cloud?
3	If the ansewr to #2 is yes, are you using perpetual license and paying software assurance?
4	If the ansewr to #2 is yes, are you using subscription license and paying subscription cost?
5	If the ansewr to #2 is yes, will you be open to consider using a managed service with License Included, assuming we could make the economics work?
6	Do you see value of having AWS manage your SQL databases?
7	If the answer to #6 is yes, then what are the primary motivations (e.g. cost saving, staff productivity, operational resilience, business agility)?
8	What is the timeline for SQL Server migration to the Cloud? (Please input an estimated target date)
9	What are the current SQL Server versions you are running? (Multiple choices)
	Earlier than 2012
	2012
	2014
	2016
	2017
	2019
10	What are the current SQL Server edition you are running? (Multiple choices)
	Express
	Developer
	Web
	Standard
	Enterprise
11	How many SQL Server instances are you currently running? (Please input an estimated number)
12	How many SQL Server instances are you considering as part of this migration? (Please input an estimated number)

L200	
1	Do you need root-level access to the OS, or sysadmin access to the DB?
2	If the answer to Question 1 is yes, why? (Please input the reason)
3	Are your SQL Server instances leveraging any of the following?
	Data compression (requires enterprise edition)
	Online indexing (requires enterprise edition)
	SQL Server Replication (not yet supported, but on the roadmap for RDS SQL Server)
	Heterogeneous linked server (not yet supported, but on the roadmap for RDS SQL Server)
	Database Log Shipping (not supported RDS SQL Server)
	Extended stored procedure (not supported by RDS SQL Server)
	FILESTREAM (not supported by RDS SQL Server)
	Resource Governor (not supported by RDS SQL Server)
	Service Broker endpoints (not supported by RDS SQL Server)
	Buffer pool extension(not supported RDS SQL Server)
	Data Quality Services(not supported RDS SQL Server)
	Database snapshots (Amazon RDS supports only DB instance snapshots)
	File tables(not supported RDS SQL Server)
	Machine Learning and R Services (requires OS access to install it.not supported RDS SQL Server)
	Policy-Based Management(not supported RDS SQL Server)
	PolyBase(not supported RDS SQL Server)
	Server-level triggers(not supported RDS SQL Server)
	Stretch database(not supported RDS SQL Server)
	TRUSTWORTHY database property (requires sysadmin role .not supported RDS SQL Server)
	T-SQL endpoints (all operations using CREATE ENDPOINT are unavailable.not supported RDS SQL Server)

RDS Discovery Tool

- Run against fleet of SQl Server to detect RDS Limitation
  - CLR
  - Native Replication
  - FileStream
  - Native Log Shipping
  - Resource Governor
  - File tables
  - Machine Learning and R Services (requires OS access to install it)
  - Maintenance plans
  - Performance Data Collector
  - Policy-Based Management
  - PolyBase

RdsDiscovery Output

- Detailed Excel Sheet

Server Na	Where is t	read-host	Are you u:	Are you u:	will you b	Do you se	Then wha	What is th	SQL Server Current Edition	SQL Server current Version	SQL Server Replication	Heterogeneous linked server	Database Log Shipping	F
111.111.11	ONPrem	N				N		12	Enterprise Edition: Core-based Licensing (64-bit)	14.0.3430.2	Y	Y	N	N
2.222.22.2	ONPrem	N				N		12	Standard Edition (64-bit)	13.0.5882.1	N	N	N	N
33.333.55.	ONPrem	N				N		12	Enterprise Edition: Core-based Licensing (64-bit)	15.0.4178.1	N	N	N	N

Server Side Trigger	R & Machine Learning	Data Qulaity Services	Policy Based Management	CLR Enabled (only supportd in Ver 2016)	DB count (	Total DB Size in GB	RDS Compatible	RDS Custom Compatible	EC2 Compatible	Enterprise Level Feature Used	Memory	CPU	Instance Type
Y	N	N	Y	N	N	0.2	N	Y	Y	Compression, ChangeCapture	54	36	db.m5.12xlarge
N	N	N	N	N	N	0.81	Y	Y	Y		28	16	db.m4.4xlarge
Y	N	N	N	Y	N	0.55	N	Y	Y	Partitioning, Compression, ChangeCapture	80	48	db.m5.12xlarge

- HTML Summary

SQL Server Discovery Report

ServerName	VCPU	Memory	Total DB Size in GB	Server Role	Read Only Replica	SQL Server Edition	RDS Compatible	RDS Custom Compatible	EC2 Compatible	Enterprise Level Feature Used	Instance Type
[redacted]	36	54	0.00	Standalone	N	Enterprise Edition: Core-based Licensing (64-bit)	N	Y	Y	Compression, ChangeCapture	db.m5.12xlarge
[redacted]	48	80	0.00	Standalone	N	Enterprise Edition: Core-based Licensing (64-bit)	N	Y	Y	Partitioning, Compression, ChangeCapture	db.m5.12xlarge

SQL Server Assessment Tool(SSAT)

- Collect Sql Server metrics
  - Memory
  - CPU
  - IOPS
  - Throughput
- Data collection is done every Minutes.
- Data collection is collected from within Sql server to minimize the Storage and server noise
- Data Is stored on each Server in MSDB
- By Default runs on top of RdsDiscovery Output

SSAT Agent And Agentless

- Agent
  - Tables are created in MSSDB and data collected every minute using a Sql agent Job
- Agentless
  - Use the Query that come with the Tool to generate the Load and upload it into the tool for Assessment
  - Use 3rd party tool to generate Metrics and upload it to the Tool

SSAT Output(CPU& Memory)

- CPU Metrics
  - CPU Pressure %
  - CPU 95 Percentile %
  - Total Utilization %
- Memory Metrics
  - Memory Utilization%
    - Max Sql server Memory
    - PLE Across all Numa Nodes

F	G	H	J
CPU Pressure Utilization(%)	CPu95Percentile	Total CPU Utilization(%)	Server Memory Utlization%
0	2	0	81
4	7	5	4

SSAT Output(Scaling Up OR Down)

- Scaling
  - Memory Utilization>80 & CPU utilization<=80 - Memory Optimize Instance
  - Memory >=80 CPU >=80 Scale Up Memory Optimize Instance
  - Memory <=80 CPU >= 80 Scale up General Purpose Instance
  - Memory <=50 CPU <=50 Scale down
  - Memory & CPU >=50 and Memory &CPU <=80 No action

E	G	H	I	J
CPU Recommendation	CPu95Percentile	Total CPU Utilization(%)	Mem Recommendation	Server Memory Utlization%
compute can be scaled down	2	0	Need To scale Memory UP	81
compute can be scaled down	7	5	Memory can be scaled down	4

P	Q	R	S	T	U	V	W	X
RDS Recommendation based on current configuration	RDS Recommendation based on load							
m5.12xlarge	db.r5.12xlarge ,db.r5b.12xlarge,db.r5d.12xlarge,db.z1d.12xlarge,db.r6i.12xlarge							
m5.12xlarge	db.m6i.8xlarge ,db.m5d.8xlarge ,db.m5.8xlarge							

SSAT (IOPS and Trhoughput)

- IOPS and Throughput Metrics
  - Metrics are collected from the DB file rather than from the server.
  - Metrics are collected per database.
  - IOPS and Throughput are used along with Memory, CPU for Instance sizing
  - Your instance can be scaled up based on IOPS and throughput as well

J	K	L	M
Server Memory Utlization%	Totaliops	ThroughPut(MB)	Bandwith
81	637	5	coming Soon
4	0	0	coming Soon

E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
CPU Recommendation	CPU Press	CPu95Per	Total CPU	Mem Recommendation	Server Me	Totaliops	ThroughP	Bandwith	SQl server	Sql server	RDS Recommendation based on current configuration	RDS Recommendation base		
compute can be scaled down	0	25	25	Memory can be scaled down	38	39833(Scaled up)	658	coming Sc	EE	14	m5.12xlarge	db.m5.12xlarge		
compute can be scaled down	0	0	0	Need To scale Memory UP	100	48	0	coming Sc	EE	15	m5.12xlarge	db.r5.12xlarge		

Agentless

- Run Sqlassessmentmanaulcollection located in C:\RDSTools\in
- The script can be scheduled or run from query analyzer
- Save the output in CSV and upload it to the SSAT Tool

	Servername	cpurecomm	cpuUtilization	cpu95percentile	CU_count	MaxMemory	Memecomm	Memutilization	throughput	Totaliops	edition	ProductVersion	collectiontime
1	[redacted]	compute can be scaled down	0	NULL	36	55244	Memory can be scaled down	0	0	0	EE	14	1

CPU Metrics

- CPU Metrics
  - CPU Pressure %
    - The percentage of CPU over 80 %
  - CPU 95 Percentile %
    - The 95 Percentile of your CPU usage
  - Total Utilization %
    - Average CPU usage

	SqlSerCpuUT	SystemIdle	OtherProCpuUT	Collectiontime
1	13	82	5	2023-01-24 11:49:43.0000000
2	17	75	8	2023-01-24 08:09:21.0000000
3	18	73	9	2023-01-24 08:06:21.0000000
4	18	72	10	2023-01-24 08:44:25.0000000
5	18	77	5	2023-01-24 11:47:43.0000000
6	19	72	9	2023-01-24 08:10:21.0000000
7	19	76	5	2023-01-24 11:29:41.0000000
8	20	75	5	2023-01-24 11:45:43.0000000
9	20	75	5	2023-01-24 12:03:45.0000000
10	20	75	5	2023-01-24 12:06:45.0000000
11	20	71	9	2023-01-24 08:07:21.0000000
12	20	71	9	2023-01-24 08:08:21.0000000
13	21	68	11	2023-01-24 08:21:23.0000000

- CPU Pressure is 0
- CPU 95 Percentile
  - Order by SQLServerCPUUT asc
  - 95 Percentile is Count*0.95 =13

Memory Metrics

- Memory Metrics
  - Memory Utilization%
    - Max Sql server Memory
    - PLE across all NUMA nodes

	SQL_ColletionTime	SQLCurrMemUsageMB	SQLMaxMemTargetMB	OSTotalMemoryMB	OSAVAMemoryMB	PLE
1	2023-01-24 08:07:00.0000000	131069	131072	163839	23118	953
2	2023-01-24 08:08:00.0000000	131070	131072	163839	23127	1012
3	2023-01-24 08:09:00.0000000	131070	131072	163839	23160	1073
4	2023-01-24 08:10:00.0000000	131070	131072	163839	23159	1131
5	2023-01-24 08:14:00.0000000	131069	131072	163839	22923	1373
6	2023-01-24 08:17:00.0000000	131069	131072	163839	22899	1552
7	2023-01-24 08:20:00.0000000	131071	131072	163839	22897	1732
8	2023-01-24 08:21:00.0000000	131071	131072	163839	22863	1792
9	2023-01-24 08:22:00.0000000	131071	131072	163839	22918	1852
10	2023-01-24 08:23:00.0000000	131071	131072	163839	22915	1912
11	2023-01-24 08:26:00.0000000	131071	131072	163839	22877	2091
12	2023-01-24 08:27:00.0000000	131072	131072	163839	22887	2151
13	2023-01-24 08:28:00.0000000	131072	131072	163839	22888	2212
14	2023-01-24 08:30:00.0000000	131072	131072	163839	22888	2332
15	2023-01-24 08:31:01.0000000	131072	131072	163839	22862	2393
16	2023-01-24 08:32:00.0000000	131072	131072	163839	22900	2452
17	2023-01-24 08:33:00.0000000	131072	131072	163839	22901	2512

- **PLE** is collected from all NUMA nodes not from the buffer Manager
  - sys.dm_os_performance_counters WHERE counter_name = 'Page Life expectancy' AND object_name LIKE '%buffer node%'
  - PLE [SQLCurrMemUsageMB]/1024)/4)*300
- **SQLCurrMemUsageMB** is the MAX memory allocated for your instance
- **Memory utilization**
  - Max Memory >80 + Max Memory /1024/4*300 <PLE

SQLCurrMemusageMB: Max allocated Memory on the instance
SQLMaxMemtarget : Target Memory
OSTotalMemory : Total Physical Memory
OSAAMemoryMB: OS Memory

SQL Assessment Output

- Detailed Excel Sheet

A	B	C	D	E	F	G	H	I	J	K	L
Server Na	Logical CP	MaxMem	Collection	CPU Recommendation	CPU Pressure Util	CPu95Per	Total CPU	Mem Recommendation	Server Memory Utlization%	Totaliops	ThroughPut(MB)
[redacted]101	36	53		compute can be scaled down	0	2	0	Memory Load is acceptable	69	89048	1449
[redacted]	48	80		compute can be scaled down	0	0	0	Memory can be scaled down	0	19	0

N	O	P	Q	R	S
SQl server edition	Sql server version	RDS Recommendation based	RDS Recommendation based on loa		
EE	14	m5.12xlarge	db.r5b.12xlarge,db.z1d.12xlarge		
EE	15	m5.12xlarge	db.m5.8xlarge ,db.m5d.8xlarge ,db		

- HTML Summary

SQLAssessment Report

ServerName	VCPU	Memory(GB)	CPU Utilization	CPU 95 Percentile	Memory Utlization	Total iops	Throughput	SQl server edition	SQl server Version	RDS Instance
[redacted]	36	53	0	2	69	89048	1449	EE	14	db.r5b.12xlarge,db.z1d.12xlarge
[redacted]	48	80	0	0	0	19	0	EE	15	db.m5.8xlarge ,db.m5d.8xlarge ,db.m6i.8xlarge

24/03/2023 09:14:15

Elasticache Assessment

- RdsDiscovery
  - Quick assessment into read vs Write cached Queries.

- Sql Server Assessment (SSAT)
  - Detailed assessment of Read VS write throughout the assessment duration.
  - DB and Server level Assessment

TCO

- Cost Comparison between EC2 and RDS
- Database infrastructure costs, including compute, storage, backups, and data transfer .
- Additional costs of self-managing databases on EC2, based on your desired EC2 configuration
- Staff productivity savings (hours saved) estimate, based on managed database benefits

TCO Intake(Internal)

- TCO is updated through RdsDiscovery and Sqlassessment
- SQl Server DB Role :
  - Standalone
  - Primary
  - Readable
- SQl server is priced using 2 models
  - Like to like
  - Optimized.

vCPU	Memory	Storage	Edition	IsPartOfClust	IsAlwaysonFC	IsAlwaysonAG	DBRole	IsReadRepl	InstanceType	CPU(Utilization)
36	54	0	Enterprise	N	N	N	Standalone	N	db.m5.2xlarge	100
48	80	0	Standard	N	N	N	Standalone	N	db.r5.8xlarge	100
4	14	0	Enterprise	Y	N	Y	Primary	Y	db.m5.4xlarge	100
4	14	0	Enterprise	Y	N	Y	Readable	Y	db.m5.16xlarge	100

IsEEFeatureUsed?	Right-sizedInstanceType	Right-SizedEdition	DeploymentOption	LikeToLikeRDS/hr	OptimizedRDS/hr	EC2InstanceType	EC2/hr
Y	db.m5.2xlarge	Enterprise	Single-AZ	4.672	4.672	m5.2xlarge	0.752
Y	db.r5.8xlarge	Standard	Single-AZ	12.16	12.16	r5.8xlarge	3.488
Y	db.m5.4xlarge	Enterprise	Multi-AZ	13.314	13.314	m5.4xlarge	1.504
Y	db.m5.16xlarge	Enterprise	FALSE	#N/A	#N/A	m5.16xlarge	6.016

TCO summary

Summary	
Server Count - Discovered	15
Total Server Count (Including FCI Secondaries)	15
Total Storage GB	0
Average Storage GB Per Instance	0
Like To Like RDS Total Per Hour	$56.06
Optimized RDS Instance Total PerHour	$28.03
Like To Like RDS Total Per Month	$40,926.72
Optimized RDS Instance Total Per Month	$20,463.36
Like To Like RDS 3-Year Total	$1,473,361.92
Optimized RDS Instance 3-Year Total	$736,680.96
EC2 Instance Only 3-Year Total	$237,150.72
SQL License & Software Assurance 3-Year	$1,247,628.72
SQL Server + Software Assurance + EC2 3-Year	$1,484,779.44

Licensing Input (BYOL SQL Server & Software Assurance on EC2)

Database Edition	# of Standalone Servers	# of Primary Servers	# of Secondary Servers (standby)	# of Readable Secondary Servers	Total # of EC2 Instances	Total # of Cores to License	Total # of Licenses Needed	SQL License Cost (Per 2-Core)	Yearly Software Assurance (Per 2-Core)	SQLLicense Cost (All Cores)	Software Assurance (3-Year Total)	SQL License + Software Assurance (3-Year Total)
SQL Server Enterprise	2	0	0	0	2	84	42	$13,748.00	$3,437.00	$577,416.00	$433,062	$1,010,478
SQL Server Standard	0	0	0	0	0	0	0	$3,586.00	$896.50	$0.00	$0	$0

Annual EC2 vs. RDS OSS Database Cost Summary - 3 Year

Cost Component	EC2	RDS Optimized
Compute	$1,484,779	$1,718,922
Storage	$0	$0
Backup & Snapshots	$0	$0
Data Transfer Costs (MAZ)	$0	$0
EC2 Tooling	$237,506	$0
Staff, Risk Mitigation & Infrastructure	$495,690	$0
Total Cost	**$2,217,976**	**$1,718,922**

Potential % Cost Savings on RDS	**29%**
$ Cost Savings on RDS - 3 Year	**$499,053**

Value of RDS

AWS Managed
Customer Managed

Amazon RDS

Monitoring
Scaling
High Availability (replication, failover automation)
Database Backups
DBMS Patches
DBMS Installation
OS Patches
OS Installation
Physical Hardware

Amazon EC2

Monitoring
Scaling
High Availability (replication, failover automat
Database Backups
DBMS Patches
DBMS Installation
OS Patches
OS Installation
Physical Hardware

Rdstools Performance impact

The Tool has Very little impact on your Server and DB . It only collects Meta data .

	SqlSerCpuUT	SystemIdle	OtherProCpuUT	Collectiontime
1	0	99	1	2023-02-08 13:16:39.993
2	0	99	1	2023-02-08 13:17:40.077
3	0	99	1	2023-02-08 13:18:40.133
4	0	99	1	2023-02-08 13:19:40.187
5	0	99	1	2023-02-08 13:20:40.257
6	0	99	1	2023-02-08 13:21:40.303
7	0	99	1	2023-02-08 13:31:40.987
8	0	99	1	2023-02-08 13:32:41.060
9	0	99	1	2023-02-08 13:33:41.113
10	0	99	1	2023-02-08 13:34:41.187
11	0	99	1	2023-02-08 13:35:41.270
12	0	99	1	2023-02-08 13:36:41.303
13	0	99	1	2023-02-08 13:37:41.383
14	0	99	1	2023-02-08 13:38:41.453
15	0	99	1	2023-02-08 13:39:41.520

	Sample_ID	Database_ID	DBName	Read	Written	BRead	BWritten	TotalB	TotalIOPs	Throuput	Netpackets	CollectionTime
1	2	2	tempdb	0	0	0	0	0	0	0	4096	2023-02-08 19:18:00.490
2	2	5	Inventory	0	0	0	0	0	0	0	4096	2023-02-08 19:18:00.490
3	2	7	DB1	0	0	0	0	0	0	0	4096	2023-02-08 19:18:00.490
4	2	8	FILESDB	0	0	0	0	0	0	0	4096	2023-02-08 19:18:00.490
5	2	9	Calendar	0	0	0	0	0	0	0	4096	2023-02-08 19:18:00.490
6	3	2	tempdb	0	0	0	0	0	0	0	0	2023-02-08 19:19:01.007
7	3	5	Inventory	0	0	0	0	0	0	0	0	2023-02-08 19:19:01.007
8	3	7	DB1	0	0	0	0	0	0	0	0	2023-02-08 19:19:01.007
9	3	8	FILESDB	0	0	0	0	0	0	0	0	2023-02-08 19:19:01.007
10	3	9	Calendar	0	0	0	0	0	0	0	0	2023-02-08 19:19:01.007
11	4	2	tempdb	0	0	0	0	0	0	0	0	2023-02-08 19:20:00.450
12	4	5	Inventory	0	0	0	0	0	0	0	0	2023-02-08 19:20:00.450
13	4	7	DB1	0	0	0	0	0	0	0	0	2023-02-08 19:20:00.450
14	4	8	FILESDB	0	0	0	0	0	0	0	0	2023-02-08 19:20:00.450
15	4	9	Calendar	0	0	0	0	0	0	0	0	2023-02-08 19:20:00.450
16	5	2	tempdb	0	0	0	0	0	0	0	-8000	2023-02-08 19:21:00.937
17	5	5	Inventory	0	0	0	0	0	0	0	-8000	2023-02-08 19:21:00.937
18	5	7	DB1	0	0	0	0	0	0	0	-8000	2023-02-08 19:21:00.937
19	5	8	FILESDB	0	0	0	0	0	0	0	-8000	2023-02-08 19:21:00.937

References

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- https://www.spotlightcloud.io/blog/monitoring-page-life-expectancy-in-sql-server#:~:text=For%20example%2C%20take%20the%20PLE,give%20you%20the%20server%20PLE
- https://learn.microsoft.com/en-us/sql/relational-databases/performance-monitor/monitor-cpu-usage?view=sql-server-ver15
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