Informix Benchmarks on Cloud Systems Updated!

By Lester Knutsen

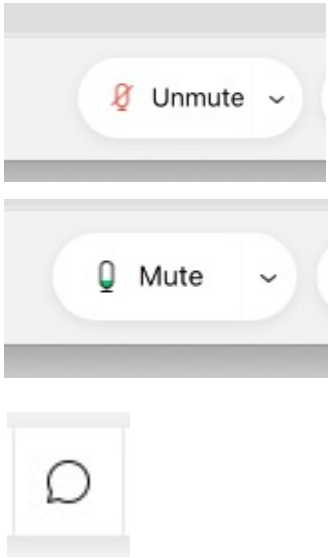
Date: Thursday, December 9, 2021, 2:00pm EST

Informix Tech Talks by the IIUG

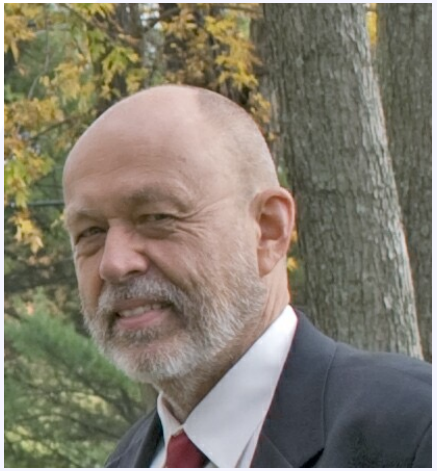
We have launched a new channel on YouTube for Informix Users! Please subscribe to our channel on YouTube to stay informed.

Webcast Guidelines

- **The Webcast is pre-recorded**. The replay and slides will be available on the IIUG Website
- **Please Mute your line.** Background sounds will distract everyone
- **Use the Chat Button** to ask questions



Lester Knutsen



Lester Knutsen has been developing database applications with IBM Informix databases since 1983. He is founder of Advanced DataTools, an IBM Informix Consulting and Training Partner. Lester is semi-retired and continues to provide Informix Training and Informix Performance Tuneup services on a limited part-time basis. Lester was the founder of the Washington D.C. Area Informix Users Group and was one of the five founding members of the International Informix Users Group. Lester Knutsen was honored to receive the IBM Champion Lifetime Achievement Award from IBM in 2020.

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Agenda

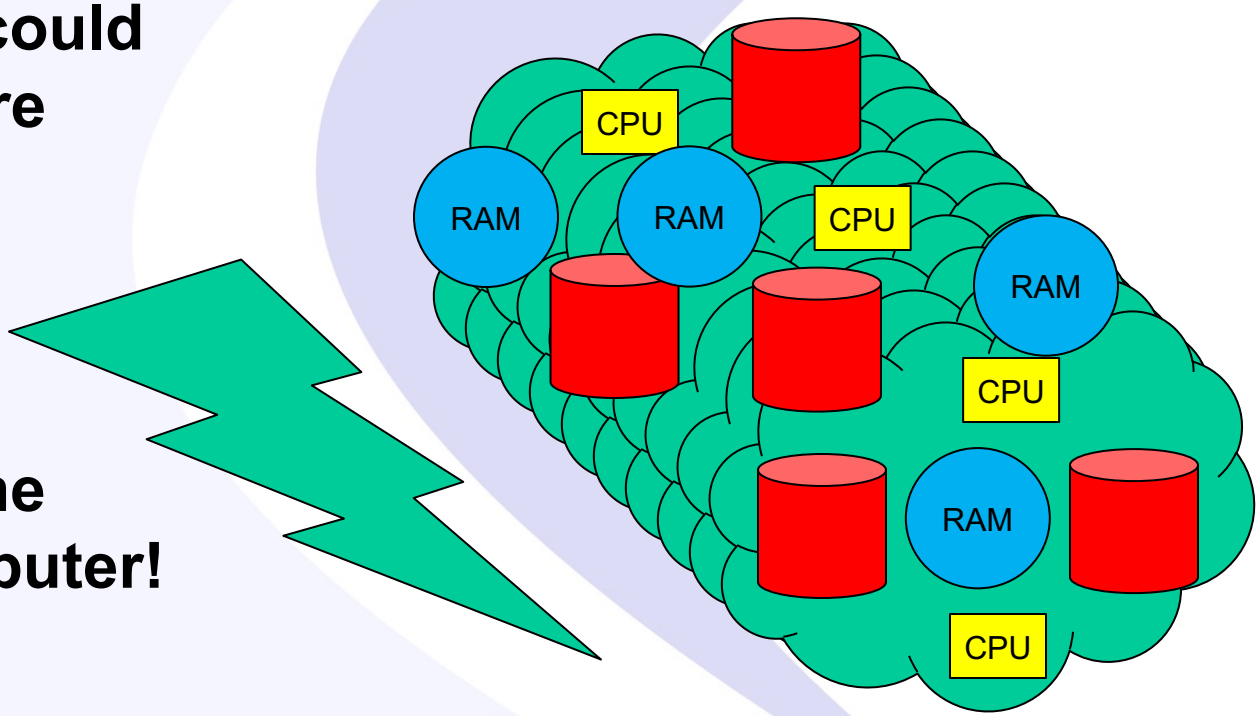
- What is the Cloud?
- Benchmarks and Tools
- Requirement: Move our Advanced Informix Performance Tuning Course Servers to the Cloud for Training Class Benchmark Labs
- Share Case Studies – Supporting Informix customers on the Cloud
- Updated - Observations About Informix in the Cloud
- Updated - Benchmark Results
- Updated - Cost Benefit Review and Learnings
- Updated - Performance Tuning Recommendations

What is Cloud Computing?

Your stuff could be anywhere

- CPU
- RAM
- Disk
- Network

On someone else's computer!



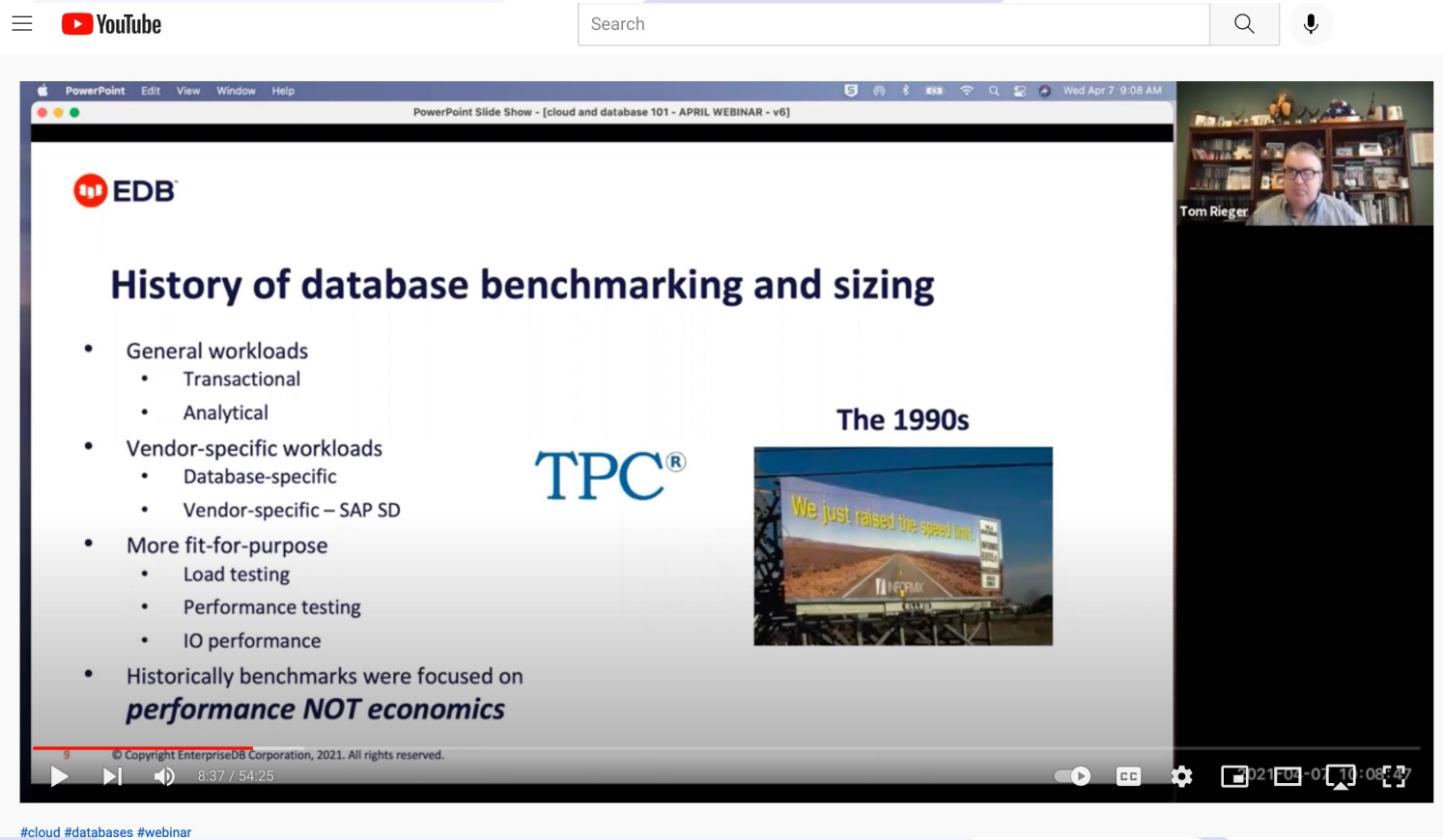
The Connection Becomes the Bottleneck

Background – Benchmark Tools

- Webcast - Cloud and Databases 101 by Tom Rieger
- Fastest Informix DBA Contest
- OpenSource Benchmark Tools – BenchmarkSQL
- Linux FIO – Flexible I/O Tester

Webinar: Cloud and Databases 101: Value, Sizing, and Best Practices – Tom Rieger April 2021

https://youtu.be/9rZ-faQMeyA

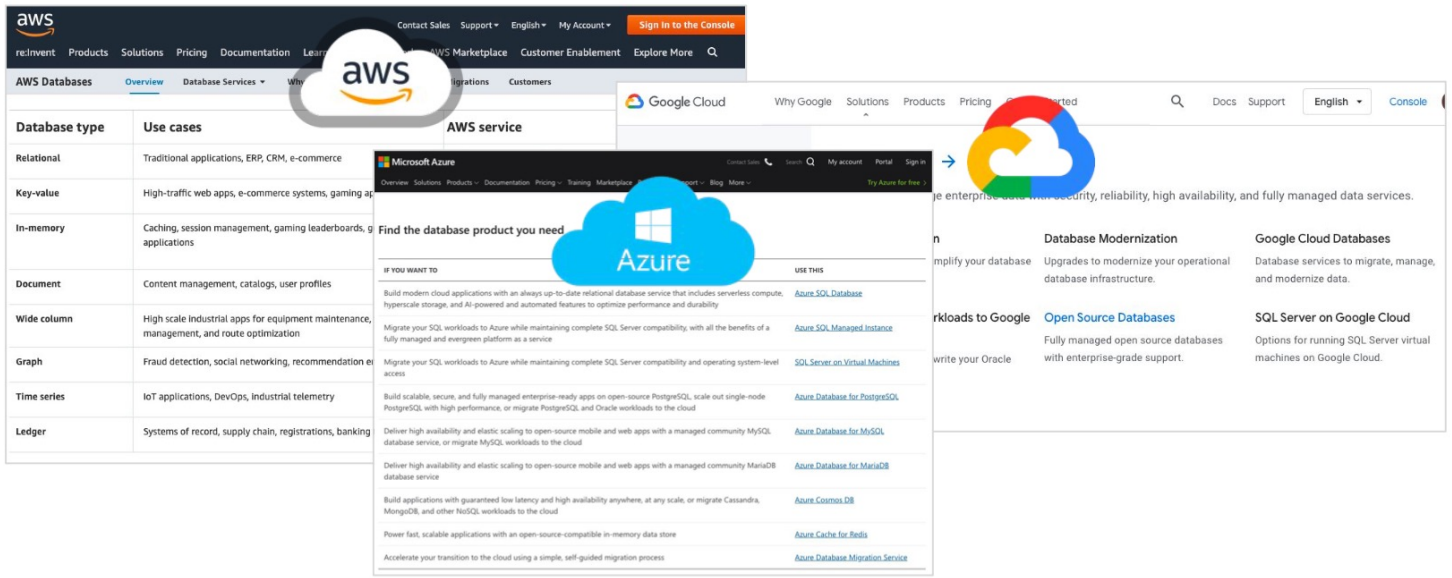


Webinar: Cloud and Databases 101: Value, Sizing, and Best Practices – Tom Rieger April 2021

https://youtu.be/9rZ-faQMeyA

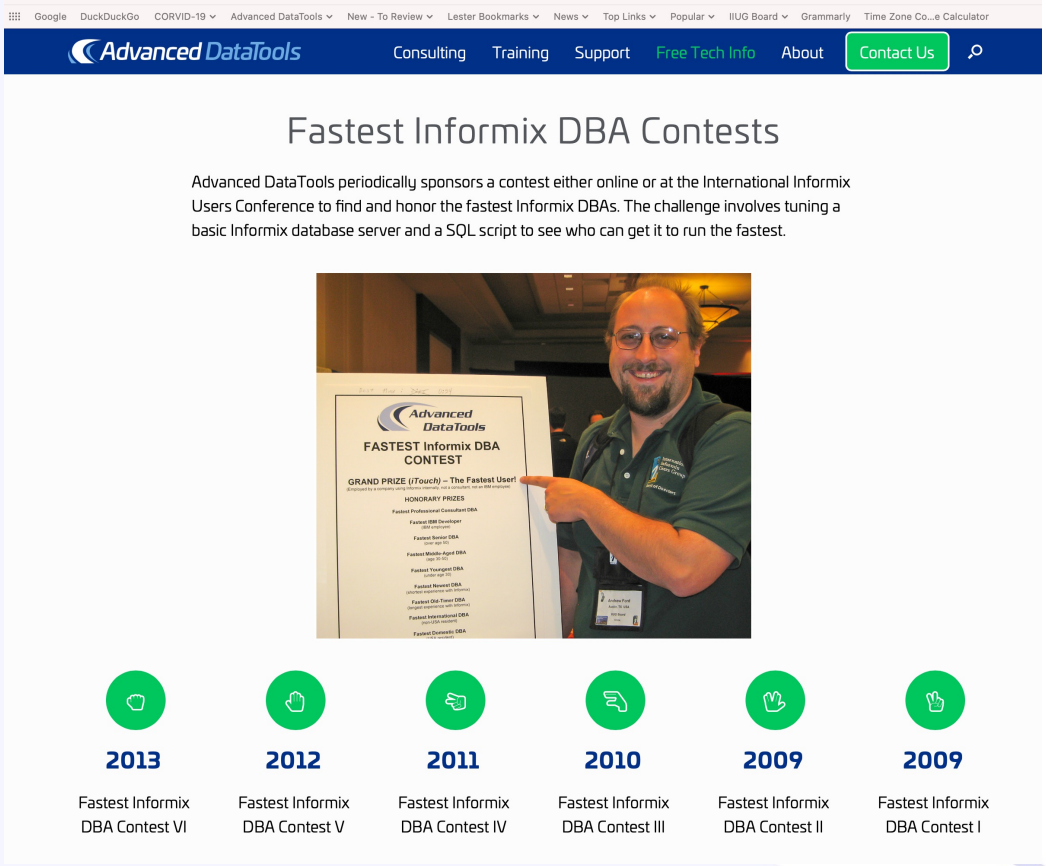
EDB

Cloud platform vendors make 'databases' confusing and 'lock in'



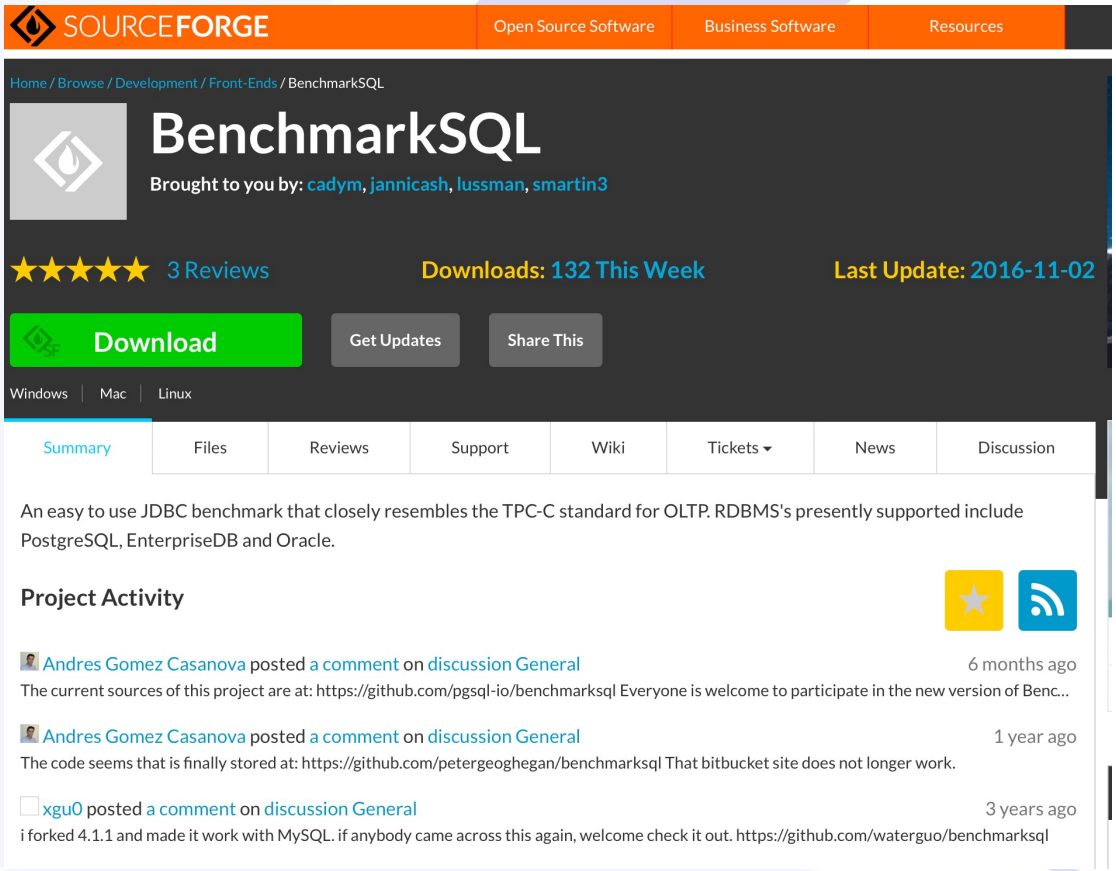
Fastest Informix DBA Contest

https://advancedatatools.com/tech-info/fastest-dba/



BenchmarkSQL

https://sourceforge.net/projects/benchmarksql/



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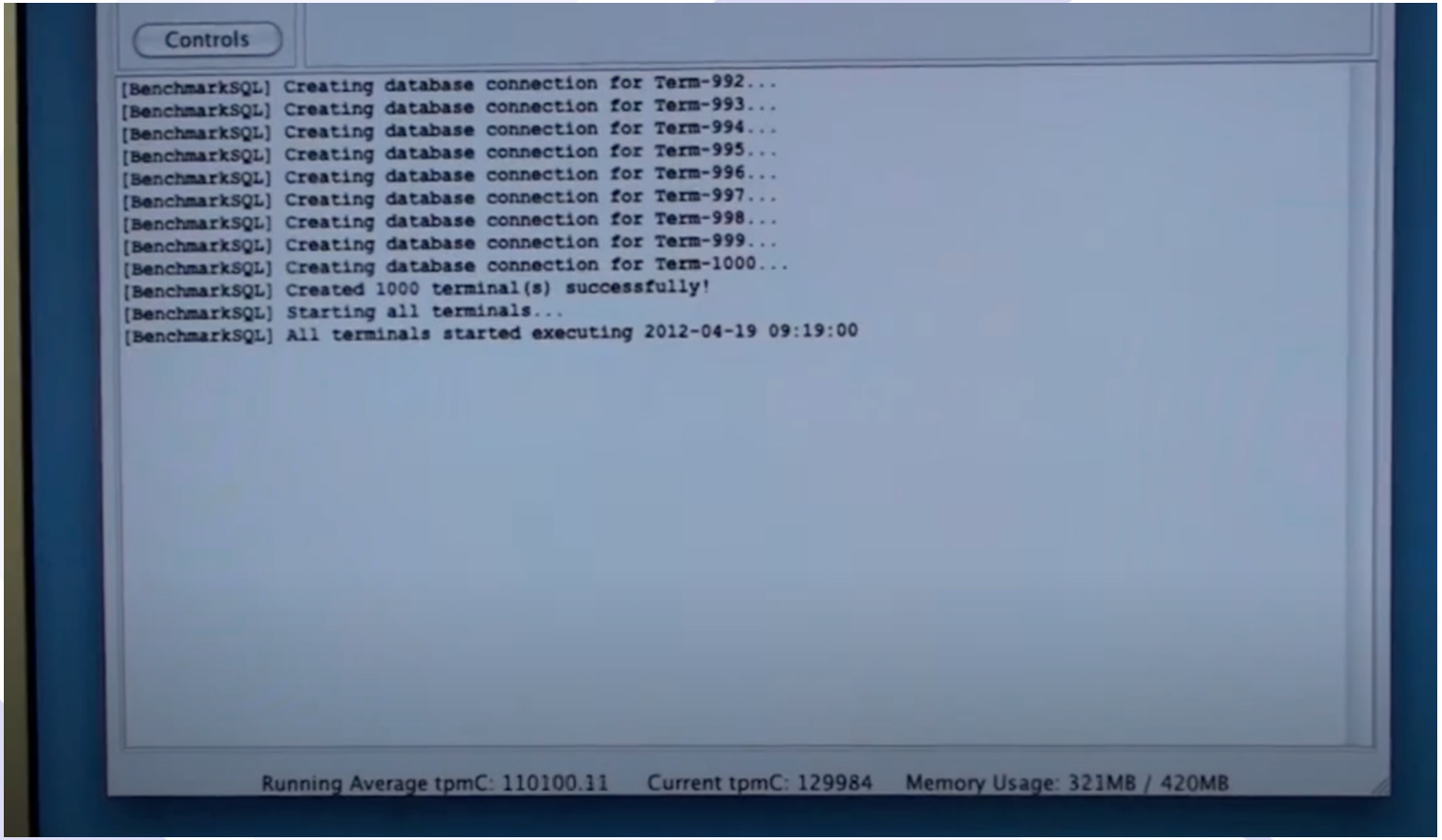
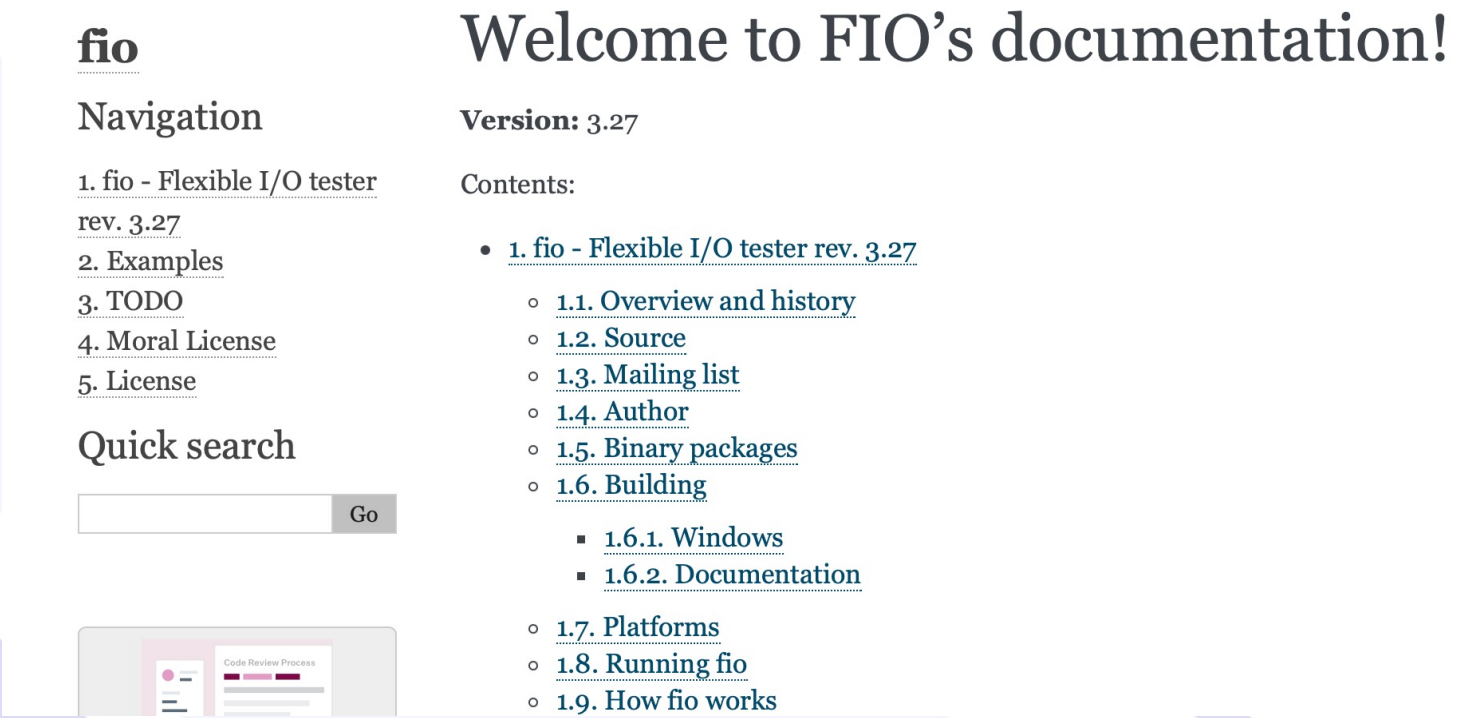


Linux - Flexible I/O tester

Available on Most Linux Distributions



fio

Navigation

1. fio - Flexible I/O tester rev. 3.27
2. Examples
3. TODO
4. Moral License
5. License

Quick search

Go

Welcome to FIO's documentation!

Version: 3.27

Contents:

- 1. fio - Flexible I/O tester rev. 3.27
  - 1.1. Overview and history
  - 1.2. Source
  - 1.3. Mailing list
  - 1.4. Author
  - 1.5. Binary packages
  - 1.6. Building
    - 1.6.1. Windows
    - 1.6.2. Documentation
  - 1.7. Platforms
  - 1.8. Running fio
  - 1.9. How fio works

Linux - Flexible I/O tester

Available on Most Linux Distributions – yum install fio

```
################################################################################
## Module: @(#)fio-test.sh     2.0     Date: 06/01/2020
## Author: Lester Knutsen  Email: lester@advancedatatools.com
##         Advanced DataTools Corporation
################################################################################
## fio options:
## --name=description of job
## --ioengine=posixaio
## --rw=write --rw=randwrite  --rw=randrw
## --bs=2k
## --size=4g
## --numjobs=1
## --runtime=60
## --time_based
## --direct=1
## --end_fsync=1


## Sequential Write Test
fio --name=seqwrite     --ioengine=posixaio --rw=write          --bs=2k --size=4g --numjobs=1 --runtime=60 --time_based
--direct=1 --end_fsync=1

## Random Write Test
fio --name=random-write --ioengine=posixaio --rw=randwrite      --bs=2k --size=4g --numjobs=1 --runtime=60 --time_based
--direct=1 --end_fsync=1

## Random Read/Write Test
fio --name=random-rw    --ioengine=posixaio --rw=randrw         --bs=2k --size=4g --numjobs=1 --runtime=60 --time_based
--direct=1 --end_fsync=1

informix@tiger6:~/InformixAdvclass/lab03-benchmark2 train1 >
```

Goal – Move my Advanced Informix Performance Tuning Course servers to the Cloud

Goal – Move 8 Servers to the Cloud

Advanced Informix Performance Tuning Course

Completed October 25-28, 2021

Are you ready to take your DBA skills to the next level?

Attend our Advanced Informix Performance Tuning taught by Lester Knutsen and Art Kagel, Informix IBM Champions.

- Attend Online via Webex
- SSH for hands-on labs on our AWS Informix server
- Participate in Q&A and collaborative class discussions
- Four days of Informix Database Performance Tuning and benchmarks

More Information on at:
https://advancedatatools.com/training/advanced-course

Requirements

- Measurable Performance
- Repeatable, Consistent Results
- Cost Effective

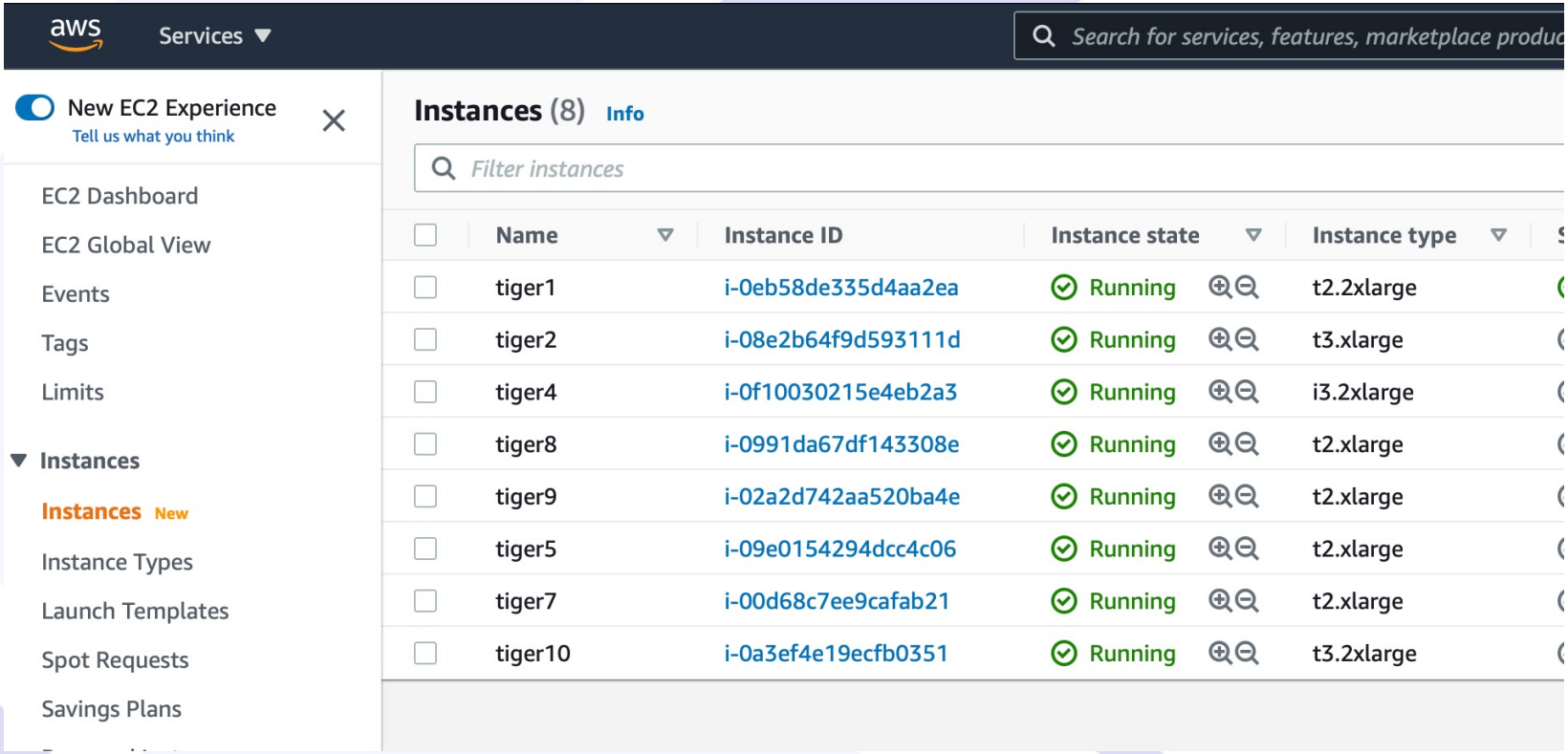
Anticipated Problems

- Disk IO Bottleneck
- Performance Variance
- Unknown Real Costs
- Problems and experience supporting Informix customers on the Cloud
- Noisy Neighbor –Instances activity that is out of my control
- What happens when the Network is down?

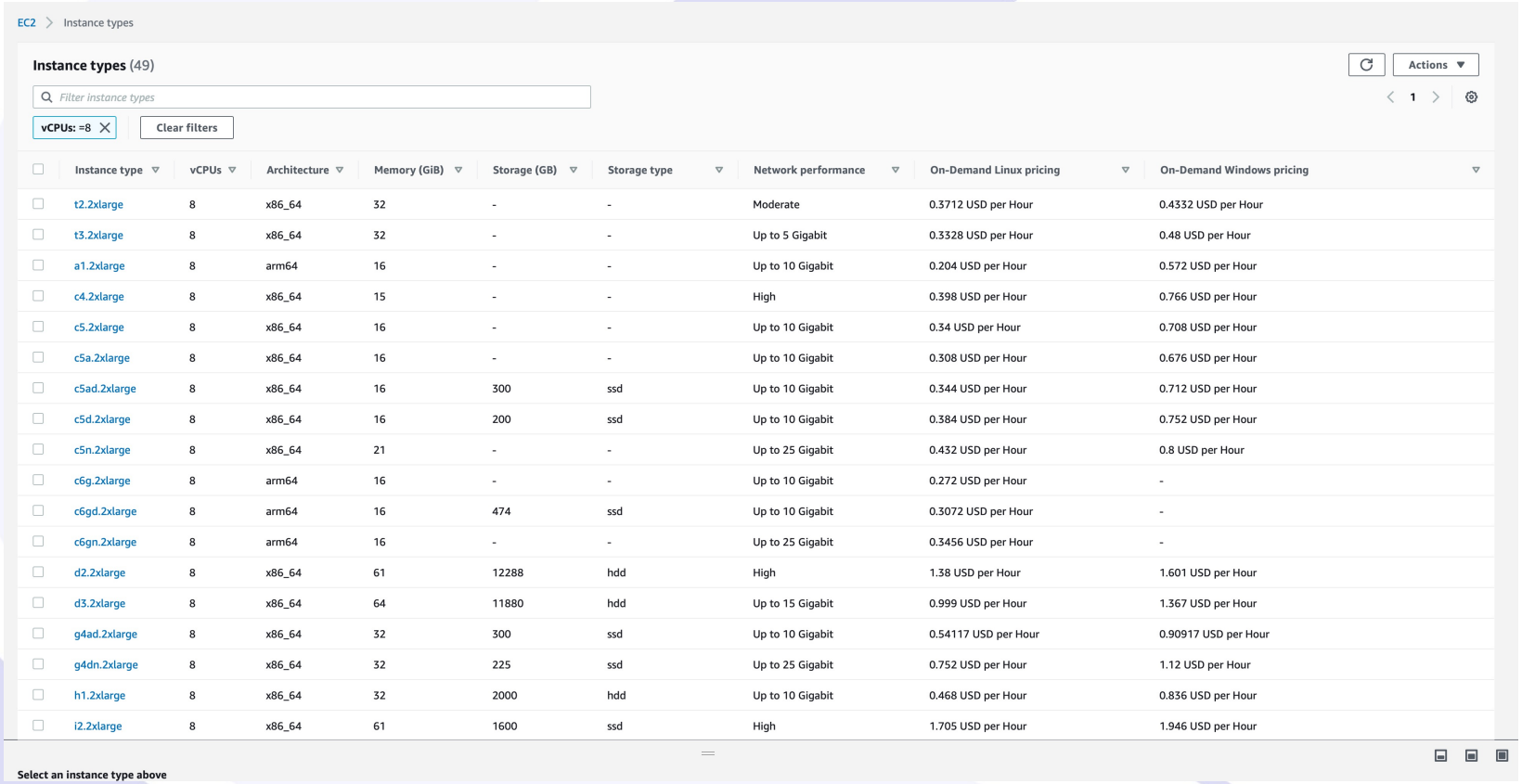
Benchmark Results

- Focus on Amazon AWS
- Twelve AWS Instances with varying configurations
- Taught Two class – Informix for DBAs with eight servers on AWS
- OS – used both Red Hat and Amazon Linux

AWS Servers


aws
Services
Search for services, features, marketplace produc
New EC2 Experience
Tell us what you think
EC2 Dashboard
EC2 Global View
Events
Tags
Limits
Instances
Instances New
Instance Types
Launch Templates
Spot Requests
Savings Plans
Instances (8) Info
Filter instances
Name
Instance ID
Instance state
Instance type
tiger1 i-0eb58de335d4aa2ea Running t2.2xlarge
tiger2 i-08e2b64f9d593111d Running t3.xlarge
tiger4 i-0f10030215e4eb2a3 Running i3.2xlarge
tiger8 i-0991da67df143308e Running t2.xlarge
tiger9 i-02a2d742aa520ba4e Running t2.xlarge
tiger5 i-09e0154294dcc4c06 Running t2.xlarge
tiger7 i-00d68c7ee9cafab21 Running t2.xlarge
tiger10 i-0a3ef4e19ecfb0351 Running t3.2xlarge

Overwhelming Choice of CPU Types: 8 CPU filter



EC2 > Instance types

Instance types (49)

Actions

Filter instance types

vCPUs: =8 | Clear filters

1

Instance type	vCPUs	Architecture	Memory (GiB)	Storage (GB)	Storage type	Network performance	On-Demand Linux pricing	On-Demand Windows pricing
t2.2xlarge	8	x86_64	32	-	-	Moderate	0.3712 USD per Hour	0.4332 USD per Hour
t3.2xlarge	8	x86_64	32	-	-	Up to 5 Gigabit	0.3328 USD per Hour	0.48 USD per Hour
a1.2xlarge	8	arm64	16	-	-	Up to 10 Gigabit	0.204 USD per Hour	0.572 USD per Hour
c4.2xlarge	8	x86_64	15	-	-	High	0.398 USD per Hour	0.766 USD per Hour
c5.2xlarge	8	x86_64	16	-	-	Up to 10 Gigabit	0.34 USD per Hour	0.708 USD per Hour
c5a.2xlarge	8	x86_64	16	-	-	Up to 10 Gigabit	0.308 USD per Hour	0.676 USD per Hour
c5ad.2xlarge	8	x86_64	16	300	ssd	Up to 10 Gigabit	0.344 USD per Hour	0.712 USD per Hour
c5d.2xlarge	8	x86_64	16	200	ssd	Up to 10 Gigabit	0.384 USD per Hour	0.752 USD per Hour
c5n.2xlarge	8	x86_64	21	-	-	Up to 25 Gigabit	0.432 USD per Hour	0.8 USD per Hour
c6g.2xlarge	8	arm64	16	-	-	Up to 10 Gigabit	0.272 USD per Hour	-
c6gd.2xlarge	8	arm64	16	474	ssd	Up to 10 Gigabit	0.3072 USD per Hour	-
c6gn.2xlarge	8	arm64	16	-	-	Up to 25 Gigabit	0.3456 USD per Hour	-
d2.2xlarge	8	x86_64	61	12288	hdd	High	1.38 USD per Hour	1.601 USD per Hour
d3.2xlarge	8	x86_64	64	11880	hdd	Up to 15 Gigabit	0.999 USD per Hour	1.367 USD per Hour
g4ad.2xlarge	8	x86_64	32	300	ssd	Up to 10 Gigabit	0.54117 USD per Hour	0.90917 USD per Hour
g4dn.2xlarge	8	x86_64	32	225	ssd	Up to 25 Gigabit	0.752 USD per Hour	1.12 USD per Hour
h1.2xlarge	8	x86_64	32	2000	hdd	Up to 10 Gigabit	0.468 USD per Hour	0.836 USD per Hour
i2.2xlarge	8	x86_64	61	1600	ssd	High	1.705 USD per Hour	1.946 USD per Hour

Select an instance type above

AWS Instance Types for Databases

- **General Purpose (t2 & t3) -** Provide a balance of compute, memory and networking resources, and can be used for a variety of diverse workloads.
- **General Purpose (m5) Balanced Workload -** Latest generation of General Purpose Instances powered by Intel Xeon® Platinum 8175M processors.
- **Storage Optimized (i3) -** Provide high, sequential read and write access to very large data sets on local storage. Provides fast NVMe SSD.
- **Memory Optimized (r6) -** Designed to deliver fast performance for workloads that process large data sets in memory.

Overwhelming Choice of SSD Disks Types

Solid state drives (SSD)

The SSD-backed volumes provided by Amazon EBS fall into these categories:

- General Purpose SSD — Provides a balance of price and performance. We recommend these volumes for most workloads.
- Provisioned IOPS SSD — Provides high performance for mission-critical, low-latency, or high-throughput workloads.

The following is a summary of the use cases and characteristics of SSD-backed volumes. For information about the maximum IOPS and throughput per instance, see Amazon EBS–optimized instances.

	General Purpose SSD		Provisioned IOPS SSD		
Volume type	gp3	gp2	io2 Block Express ‡	io2	io1
Durability	99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)	99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)	99.999% durability (0.001% annual failure rate)	99.999% durability (0.001% annual failure rate)	99.8% - 99.9% durability (0.1% - 0.2% annual failure rate)
Use cases	• Low-latency interactive apps • Development and test environments		Workloads that require: • Sub-millisecond latency • Sustained IOPS performance • More than 64,000 IOPS or 1,000 MiB/s of throughput	• Workloads that require sustained IOPS performance or more than 16,000 IOPS • I/O-intensive database workloads	
Volume size	1 GiB - 16 TiB		4 GiB - 64 TiB	4 GiB - 16 TiB	
Max IOPS per volume (16 KiB I/O)	16,000		256,000	64,000 †	
Max throughput per volume	1,000 MiB/s	250 MiB/s *	4,000 MiB/s	1,000 MiB/s †	
Amazon EBS Multi-attach	Not supported		Supported		
Boot volume	Supported				

AWS SSD Disk Types

- **General Purpose SSD**
  - gp2 – max throughput 128-250 MiB/s
  - gp3 – max throughput 1,000 MiB/s
- **Provisioned IOPS SSD**
  - io1 – max throughput 1,000 MiB/s
    - (99.8% - 99.9% durability)
  - io2 – max throughput 1,000 MiB/s
    - (99.999% durability)

Costs are Important

AWS Cost Summary per Month						
EC2 Instance Costs	**Baseline Training System**	AWS General Purpose	**AWS Balanced Workloads**	AWS General Purpose	AWS Storage Optimized	AWS Storage Optimized
Type	Lenova TS150	t2.2xlarge	**m5.2xlarge**	t3.2xlarge	i3.2xlarge	i3en.2xlarge
OS	Cento OS	Red Hat 8	**Red Hat 8**	Amazon Linux	Red Hat 8	Red Hat 8
CPU	8	8	**8**	8	8	8
Memory	16	32	**32**	32	61	64
Network	Unlimited	Moderate	**Up to 10 GB**	Up to 5 GB	Up to 10 GB	Up to 25 GB
EC2 per Hour		0.3712	**0.384**	0.3328	0.624	0.904
Month (730 hr)	233.00	270.976	**280.32**	242.944	455.52	659.92
Status	Tested	Tested	**Tested**	Tested	Tested	Not Tested

Disk Costs NOT Included in AWS Instances

SSD Disk Costs

EBS Storage Costs										
Type	gp2	gp3	gp3	**gp3**	io1	io1	io1	io2	io2	io2
IOPS	360	3000	6000	**12000**	3000	6000	12000	3000	6000	12000
Size	120 GB	120 GB	120 GB	**120 GB**	120 GB	120 GB	120 GB	120 GB	120 GB	120 GB
Month Costs / Disk	12.00	9.60	24.60	**54.60**	210.00	405.00	795.00	210.00	405.00	795.00
Month Costs 2 Disk	24.00	19.20	49.20	**109.20**	420.00	810.00	**1,590.00**	420.00	810.00	**1,590.00**

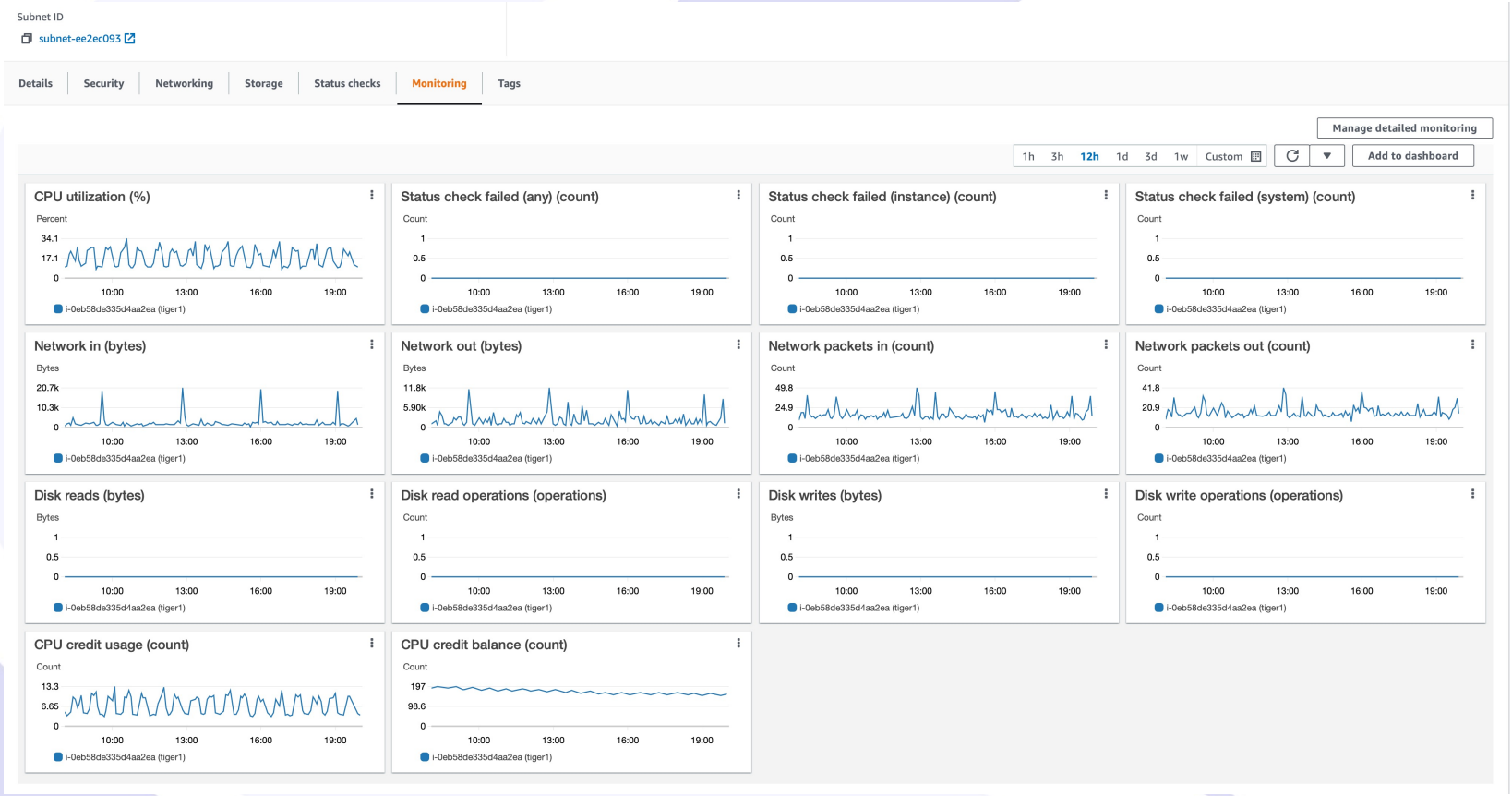
The disks are the bottleneck!

Real Cloud Cost Advantage

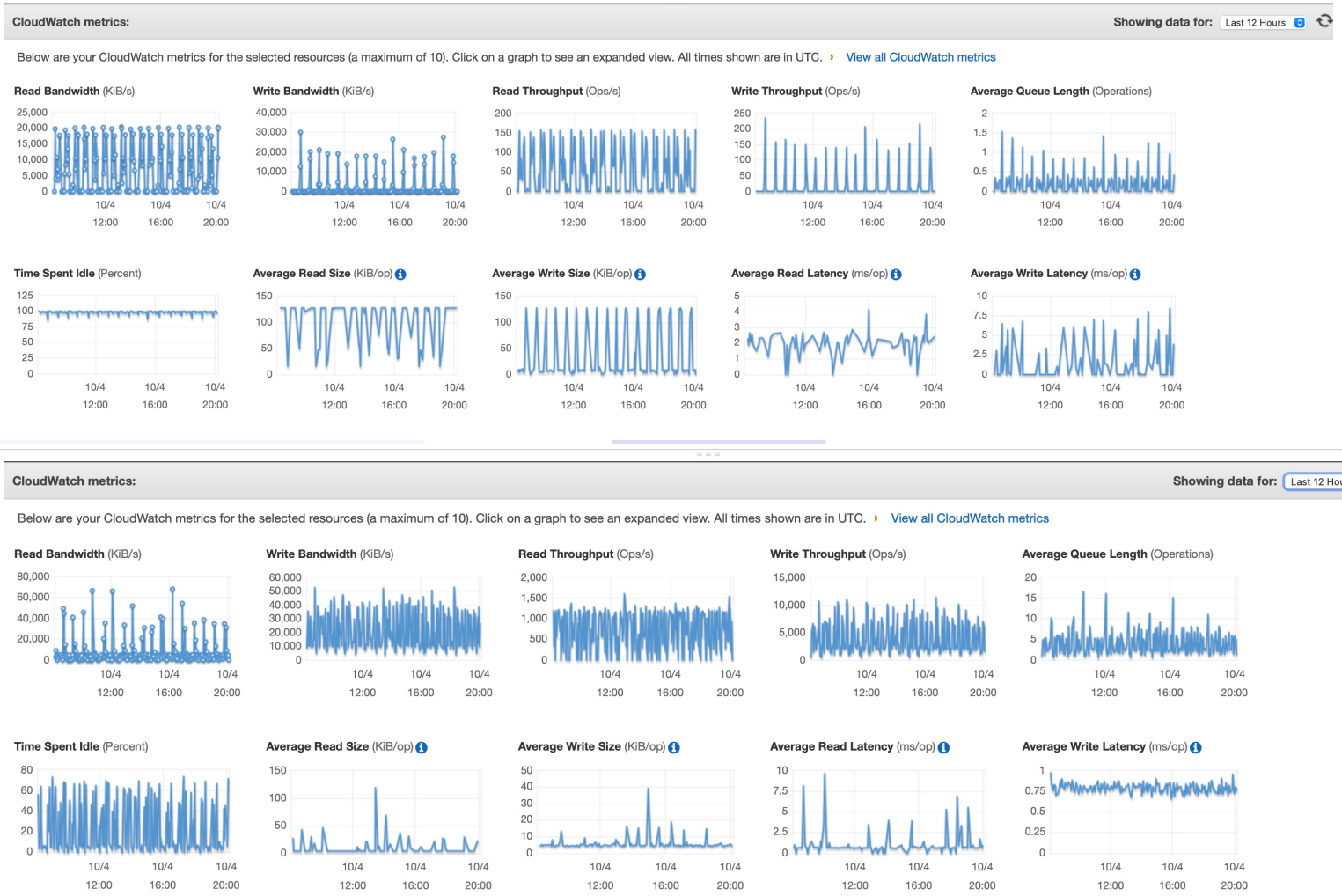
- **Turn off the Instance when not needed and SAVE costs**
- Easy to change Configuration
  - Upgrade Disks and CPU
  - Downgrade Disks and CPU
- **Monitor disk costs – they do not stop when the Instance stops**

Demo

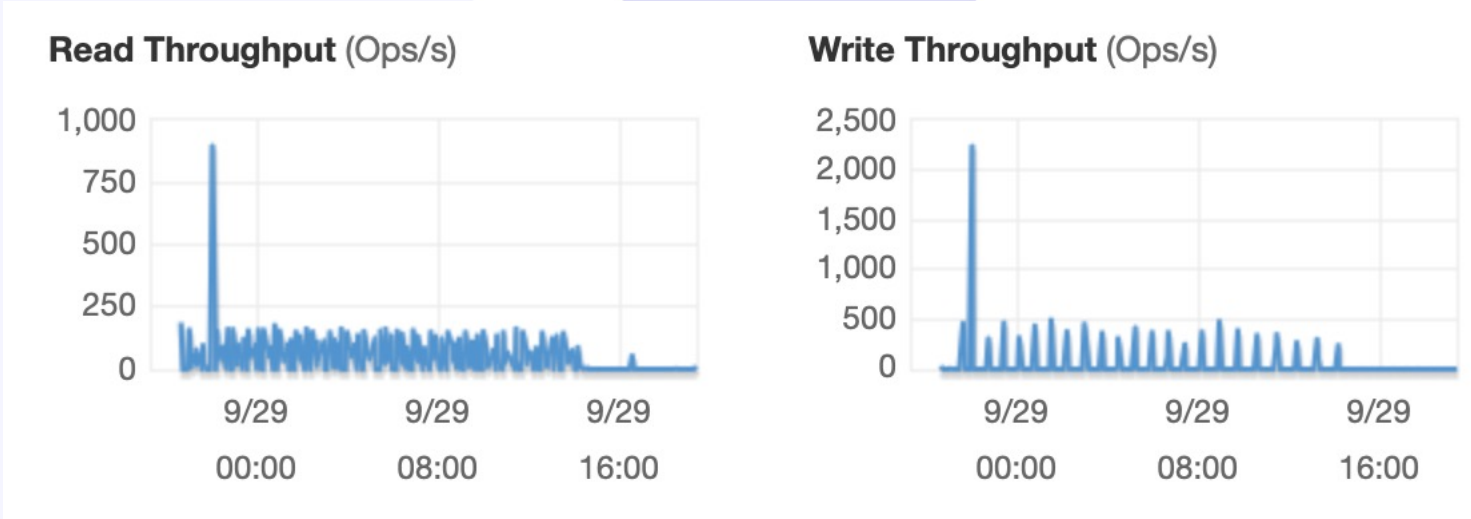
AWS Server Monitoring Tools - Instance



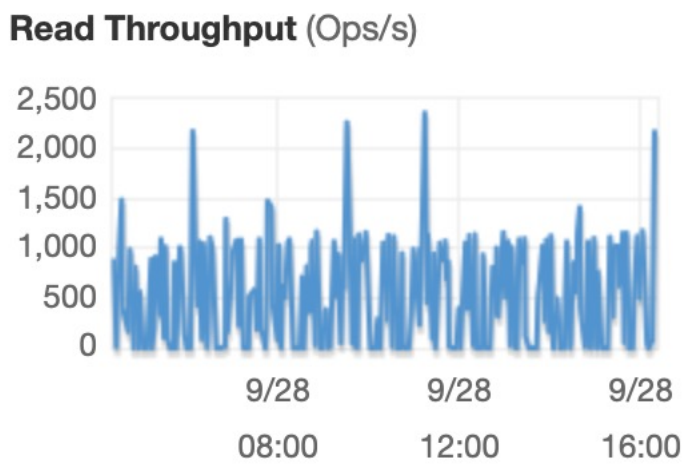
AWS Server Monitoring Disk

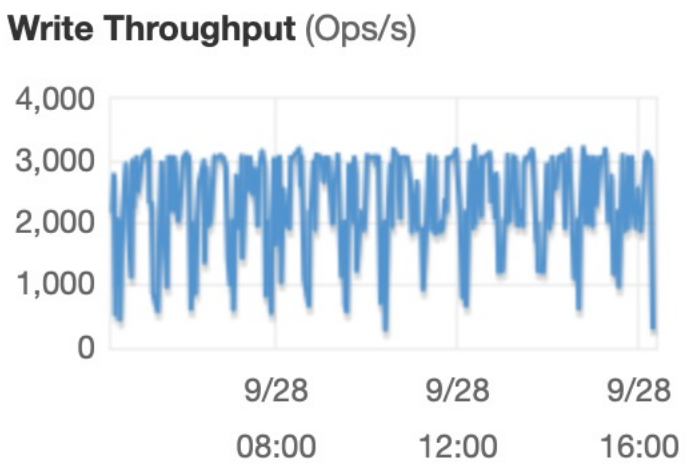


Same Workload
Disk IOPS CAP 360

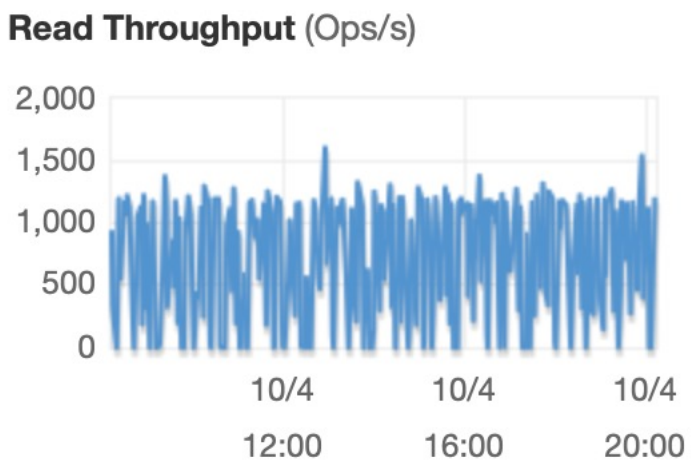


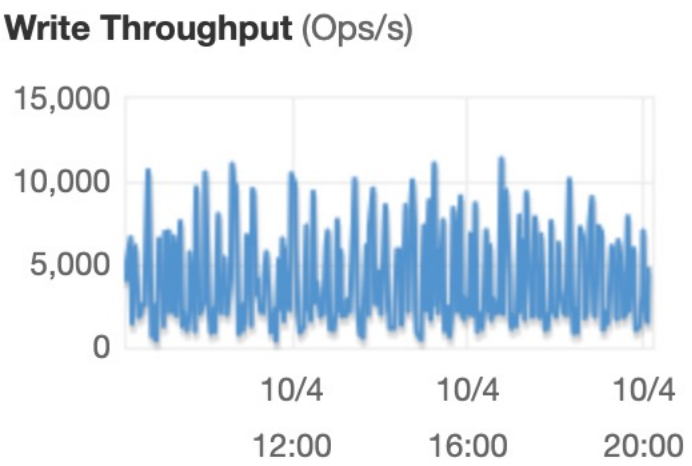
Same Workload
Disk IOPS CAP 3,000



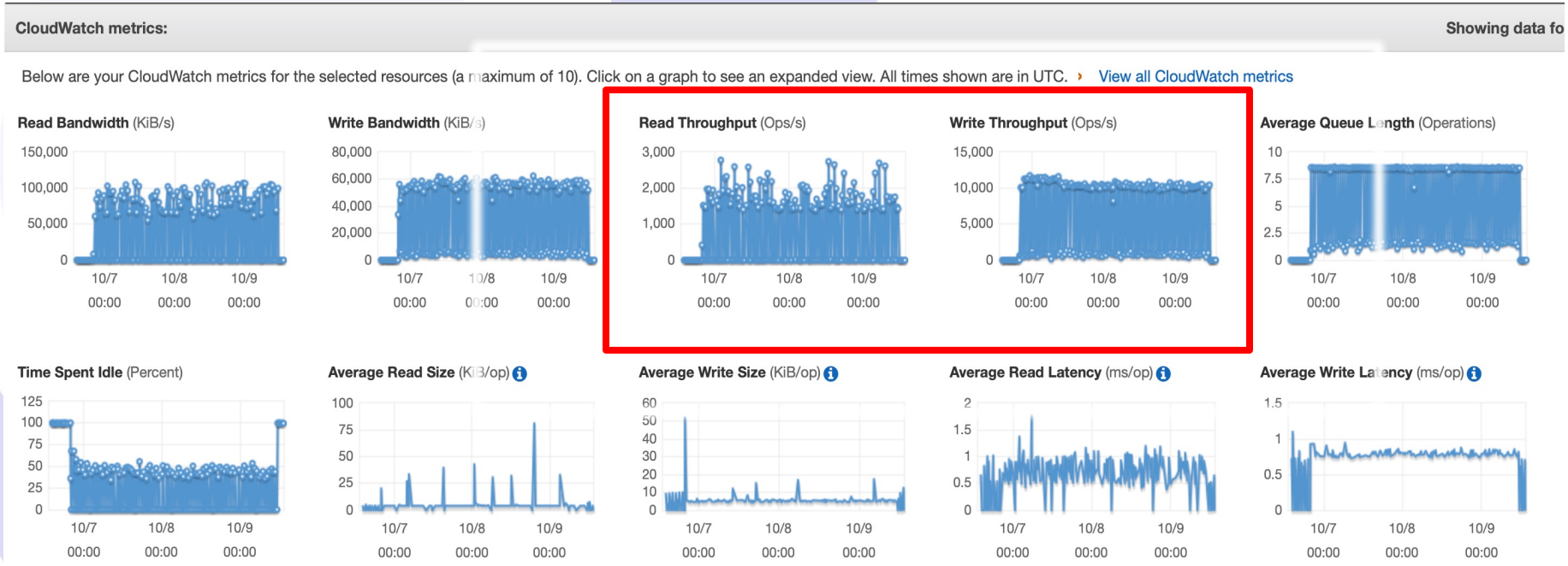


Same Workload
Disk IOPS Cap – 12,000





Same Workload
Disk IOPS CAP 16000



AWS IOPS Definition

- IOPS are a unit of measure representing input/output operations per second.
- The operations are measured in KiB, and the underlying drive technology determines the maximum amount of data that a volume type counts as a single I/O. I/O size is capped at 256 KiB for SSD volumes

IOPS

IOPS are a unit of measure representing input/output operations per second. The operations are measured in KiB, and the underlying drive technology determines the maximum amount of data that a volume type counts as a single I/O. I/O size is capped at 256 KiB for SSD volumes and 1,024 KiB for HDD volumes because SSD volumes handle small or random I/O much more efficiently than HDD volumes.

When small I/O operations are physically sequential, Amazon EBS attempts to merge them into a single I/O operation up to the maximum I/O size. Similarly, when I/O operations are larger than the maximum I/O size, Amazon EBS attempts to split them into smaller I/O operations. The following table shows some examples.

Volume type	Maximum I/O size	I/O operations from your application	Number of IOPS	Notes
SSD	256 KiB	1 x 1024 KiB I/O operation	4 (1,024÷256=4)	Amazon EBS splits the 1,024 I/O operation into four smaller 256 KiB operations.
		8 x sequential 32 KiB I/O operations	1 (8x32=256)	Amazon EBS merges the eight sequential 32 KiB I/O operations into a single 256 KiB operation.
		8 random 32 KiB I/O operations	8	Amazon EBS counts random I/O operations separately.

FIO Benchmark Tests

FIO Test	Local SSD	AWS gp3 12000 IOPS	AWS io1 6000 IOPS
Sequential Write Test	42.5MiB/s	2624KiB/s	2619KiB/s
Random Write Test	19.3MiB/s	2405KiB/s	2541KiB/s
Random Read/Write			
READ:	9,623 KiB/s	988KiB/s	1,312KiB/s
WRITE:	9,622 KiB/s	989KiB/s	1,310KiB/s
ios	272,232/272748	29,656/29801	39,356/39327

FIO AWS Results

	FIO Test - 10/21/2021	gp3 - 16000 IOPS	gp3 - 16000 IOPS	gp3 - 16000 IOPS	gp3 - 16000 IOPS	gp3 - 16000 IOPS	gp2 - 360 IOPS	gp2 - 360 IOPS
/informixchunks								
	Sequentially Write Test	2788	2858	2775	2823	3083	2876	2824
	Random Write Test	2828	2949	2859	2939	3221	2996	3037
	Random Read/Write Test - READ	1719	1702	1488	1736	1730	1915	1889
	Random Read/Write Test - WRITE	1713	1695	1478	1729	1723	1907	1881
	IOS - READ	51555	51041	44515	51902	51751	57378	56610
	IOS - WRITE	51409	50835	44213	51709	51544	57143	56351
/informixchunks2								
	Sequentially Write Test	2874	2841	2739	2844	2864	2057	2961
	Random Write Test	2876	2726	2731	2927	2906	2134	2910
	Random Read/Write Test - READ	1706	1566	1664	1780	1718	1497	1894
	Random Read/Write Test - WRITE	1700	1555	1655	1774	1712	1488	1886
	IOS - READ	51156	46966	49772	53228	51416	44848	56746
	IOS - WRITE	50998	46652	49502	53038	51229	44569	56521
/home	Sequentially Write Test		2829	2836				2603
	Random Write Test		2297	2369				2138
	Random Read/Write Test - READ		1778	1601				1698
	Random Read/Write Test - WRITE		1772	1591				1692
	IOS - READ		53338	47943				50830
	IOS - WRITE		53260	47660				50608
InformixChunks Total		223,322	213,386	205,391	228,429	224,897	220,808	245,510

FIO AWS Variance from Advanced Training Class

FIO Test - 10/21/2021								
		gp3 - 16000 IOPS	gp3 - 16000 IOPS	gp3 - 16000 IOPS	gp3 - 16000 IOPS	gp3 - 16000 IOPS	gp2 - 360 IOPS	gp2 - 360 IOPS
/informixchunks								
	Sequentially Write Test	2788	2858	2775	2823	3083	2876	2824
	Random Write Test	2828	2949	2859	2939	3221	2996	3037
	Random Read/Write Test - READ	1719	1702	1488	1736	1730	1915	1889
	Random Read/Write Test - WRITE	1713	1695	1478	1729	1723	1907	1881
	IOS - READ	51555	51041	44515	51902	51751	57378	56610
	IOS - WRITE	51409	50835	44213	51709	51544	57143	56351
/informixchunks2								
	Sequentially Write Test	2874	2841	2739	2844	2864	2057	2961
	Random Write Test	2876	2726	2731	2927	2906	2134	2910
	Random Read/Write Test - READ	1706	1566	1664	1780	1718	1497	1894
	Random Read/Write Test - WRITE	1700	1555	1655	1774	1712	1488	1886
	IOS - READ	51156	46966	49772	53228	51416	44848	56746
	IOS - WRITE	50998	46652	49502	53038	51229	44569	56521
InformixChunks Total		223,322	213,386	205,391	228,429	224,897	220,808	245,510

Note: Slower disk IOPS produced better results?

Benchmark Performance Results

Machine	tiger1 Run 1	tiger1 Run 2	tiger10	tiger2	tiger4	tiger10	tiger2	tiger4	**tiger6**
AWS Type	t2.2xlarge	t2.2xlarge	t3.2xlarge	t3.2xlarge	i3.2xlarge	t3.2xlarge	t3.2xlarge	i3.2xlarge	**Local BASELINE**
CPU	8	8	8	8	8	8	8	8	**8**
Memory	32	32	32	32	32	32	32	32	**16**
Disk	gp2 - 360 IOPS	gp2 - 3000 IOPS	gp2 - 3000 IOPS	io1 6000 IOPS	io1 6000 IOPS	gp2 - 3000 IOPS	io1 6000 IOPS	io1 3000 IOPS	**SSD**
OS	Red Hat 8	Red Hat 8	Amazon Linux 2	Red Hat 8	Red Hat 8	Amazon Linux 2	Red Hat 8	Red Hat 8	**Red Hat 8**
Setup Run	100m53.799s	53m0.351s	42m1.273s	44m20.539s	26m58.137s	42m1.273s	44m20.539s	26m58.137s	**15m0.977s**
Total Time HH:MM:SS	192:33:46	23:57:00	21:04:00	14:32:00	9:28:00	24:50:00	26:03:00	13:50:00	**27:55:00**
Runs	37	30	25	19	20	20	20	20	**100**
Average	5:12:16	0:47:54	0:50:34	0:45:54	0:28:24	1:14:30	1:18:09	0:41:30	**0:16:45**
Runs per Month	3,366.38	21,945.72	20,791.14	22,904.59	**37,014.08**	14,110.07	13,451.06	25,330.12	**62,758.21**

Updated Performance Costs

Machine	tiger 1 Run 1	tiger 2	tiger 4	tiger 4	tiger 1 Run 4	tiger6
AWS Type	t2.2xlarge	t3.2xlarge	i3.2xlarge	i3.2xlarge	m5.2xlarge	Local BASELINE
CPU	8	8	8	8	8	8
Memory	32	32	32	32	32	16
Disk	gp2 - 360 IOPS	io1 6000 IOPS	io1 3000 IOPS	io1 6000 IOPS	gp3 - 16000 IOPS	SSD
OS	Red Hat 8	Red Hat 8	Red Hat 8	Red Hat 8	Red Hat 8	Red Hat 8
EC2 Instance Costs	270.98	242.94	455.52	455.52	364.52	233.00
EBS Storage Costs	24.00	810.00	420.00	810.00		
Total Costs	294.98	1,052.94	875.52	1,265.52	364.52	233.00
Setup Run	100m53.799s	44m20.539s	26m58.137s	26m58.137s		15m0.977s
Start Time	9/11/21 2:47 AM	10/3/21 3:14	10/3/21 15:15	9/28/21 22:34	10/6/21 4:40	10/2/21 20:45
End Time	9/19/21 3:20 AM	10/4/21 5:17	10/4/21 5:05	9/29/21 8:02	10/6/21 12:21	10/4/21 0:40
Total Time HH:MM:SS	192:33:46	26:03:00	13:50:00	9:28:00	7:41:00	27:55:00
Runs	37	20	20	20	20	100
Average	5:12:16	1:18:09	0:41:30	0:28:24	0:23:03	0:16:45
Runs per Month	3,366.38	13,451.06	25,330.12	37,014.08	45,605.21	62,758.21
Est Costs per Month	294.98	1,052.94	875.52	1,265.52	364.52	233.00
Est Cost per Run	$ 0.08762	$ 0.07828	$ 0.03456	$ 0.03419	$ 0.00799	$ 0.00371

Advanced Informix Performance Tuning Class Student Lab Results

Advanced Informix Performance Tuning Lab Results - Benchmark 2 and 3					
Server	tiger1	tiger2	tiger4	tiger5	tiger7
Benchmark 2- Batch Billing Before SQL Improvements	2m14.717s	3m1	2m11.892s	3m2.049s	2m28.815s
Benchmark 3 - SQL 500 TPC/C Transaction per minute	49,480	63,372		31,064	43,840

Performance was as good as in our classrooms

Performance Tuning Recommendations

- DIRECT_IO – It depends!!!!
- Informix Mirroring improves reads (requires 2 disks to double the IOPS)
- Separate disks for Logs, Temp, Data, Indexes (spread the IOPS around)
- Remember – Databases are limited by IOPS

How to Estimate Your IOPS

Determine your IOPS and throughput requirements

PDF | RSS

Use Windows Performance Monitor to get information about IOPS and throughput.

To open Windows Performance Monitor, run **perfmon** at the command prompt. IOPS and throughput data is provided by the following performance counters:

- Disk reads/sec + disk writes/sec = IOPS
- Disk read bytes/sec + disk write bytes/sec = throughput

We recommend that you get the IOPS and throughput data for peak usage time and also over a typical workload cycle, to get a good estimate of your requirements. Make sure that the instance type you choose for SQL Server supports these I/O requirements.

It is important to get this estimate right. Otherwise, you might over-provision your resources, which might result in underutilized resources, or under-provision your resources, which might result in severe performance issues.

Remember – This only gives you an average!
You need to add 20% or more for peak periods or you are LIMITED by your average!

Example Using Onstat –p

```
IBM Informix Dynamic Server Version 14.10.FC6 -- On-Line -- Up 5 days 03:57:05 -- 3695968 Kbytes
2021-10-04 18:33:13

Profile
dskreads   pagreads   bufreads   %cached dskwrits   pagwrits   bufwrits   %cached
87753069   5288258282 20584326666 99.62   1120634556 1296709600 13825899561 91.89

isamtot    open       start      read       write      rewrite    delete     commit     rollbk
23091628276 1479340    1170446    769433343  10318351034 153268201  190943     510929     1959

gp_read    gp_write   gp_rewrt   gp_del     gp_alloc   gp_free    gp_curs
0          0          0          0          0          0          0

ovlock     ovuserthread ovbuff     usercpu  syscpu   numckpts   flushes
0          0            0          129083.35 28095.51 1478       1882

bufwaits   lokwaits   lockreqs   deadlks    dltouts    ckpwaits   compress   seqscans
25312      772828     2181863060 231        0          779        3442120    41525

ixda-RA    idx-RA     da-RA      logrec-RA  RA-pgsused lchwaits
17809120   206636     33725963   0          25942104   9050932
```

IOPS Calculation Worksheet

Advanced DataTools Corporation
Key Ratio's from Onstat -p

Server Up Time:	**5 days 03:57:05**	(From onstat -p or the last time onstat -z was run - replace with your data)
Hours Up	**123.95**	Please enter hours since the statistic where cleared
Minutes Up	**7,437.00**	Please enter monites since the statistics where cleared
Buffers	**1,500,000**	Enter number of buffers from your onconfig file
Page Size KB	**2**	Enter the default page size for Informix on your Server (2 for Linux, Solaris, 4 for AIX, Windows)

Disk IO

	dskreads	pagreads	bufreads	dskwrits	pagwrits	bufwrits	
Pages: (from onstat -p)	87,753,069	5,288,258,282	20,584,326,666	1,120,634,556	1,296,709,600	13,825,899,561	(re
Kbytes	175,506,138	10,576,516,564	41,168,653,332	2,241,269,112	2,593,419,200	27,651,799,122	
KB Per Hour	1,415,943	85,328,895	332,139,196	18,082,042	20,923,108	223,088,335	
KB Per Minute	23,599	1,422,148	5,535,653	301,367	348,718	3,718,139	

Disk R/W per Second	dskreads+dskwrite*pagesize/60	5,416
KB R/W per Second	pagreads+pagwrite*pagesize/60	29,514

Informix Average IOPS Calculation

```
------------------------------------------------------------------------
-- Module: @(#)AWSIOPS.sql      version: 2.5     Date: 10/1/2021
-- Author: Lester Knutsen  Contact: lester@advancedatatools.com
-- Copyright: Advanced DataTools Corporation - 2021
-- Description:
------------------------------------------------------------------------

{ ==
AWS IOPS Calculations
Disk reads/sec + disk writes/sec = IOPS
Disk read bytes/sec + disk write bytes/sec = throughput
}

database sysmaster;
select
        "Statics Uptime in Seconds:  " metric,
        (ROUND (( sh_curtime - sh_pfclrtime)))  value -- hours_since_stats_reset
from sysshmvals
union all
select  "Average Disk IOPS - Page RW per Second" meteric,
        (( select sum ( value ) from sysprofile where name in ( "dskreads", "dskwrites"))
        / ( select (ROUND (( sh_curtime - sh_pfclrtime)))  from sysshmvals )) value

from sysdual
union all
select  "Average Disk Throughput - Bytes per Second" meteric,
        ((( select sum ( value ) from sysprofile where name in ( "dskreads", "dskwrites"))
        * ( select sh_pagesize from sysshmvals ))
        / ( select (ROUND (( sh_curtime - sh_pfclrtime)))  from sysshmvals )) value

from sysdual;
```

Informix IOPS Calculation running Benchmark2 on Local SSD

```
SQL:  New  Run  Modify  Use-editor  Output  Choose  Save  Info
Run the current SQL statements.

---------------------- sysmaster@train1 ------- Press CTRL-W f

metric                                                  value

Statics Uptime in Seconds:                      140.000000000000
Average Disk IOPS - Page RW per Second          20063.6357142857
Average Disk Throughput - Bytes per Second      41090325.9428571
```

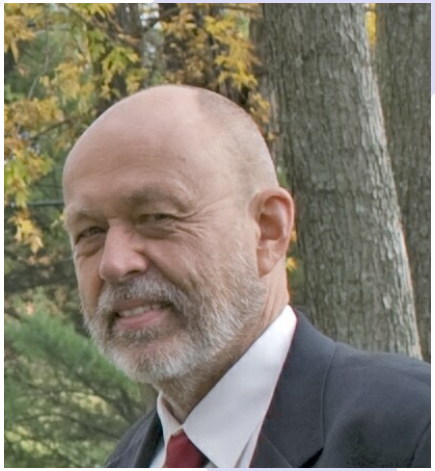
This is the Average IOPS
More IOPS will be required to manage Peak Workloads!!

Questions?

Send follow-up questions to
Lester@advancedatatools.com

Thank You

Advanced DataTools Corporation



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Thank You

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