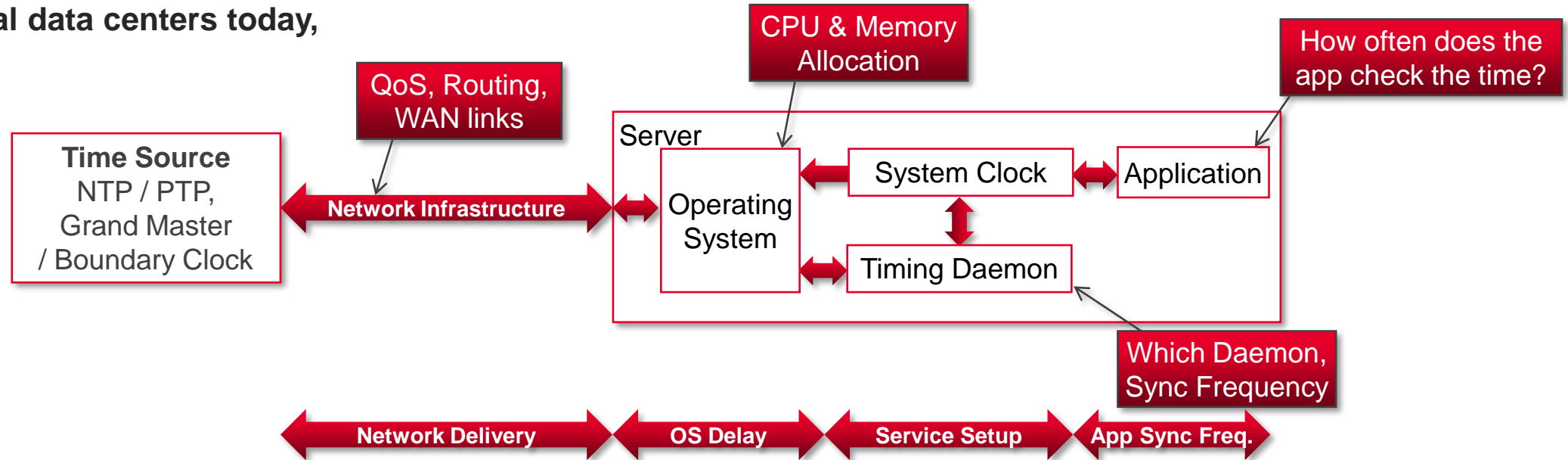


# “Three blind mice?....See how they run”

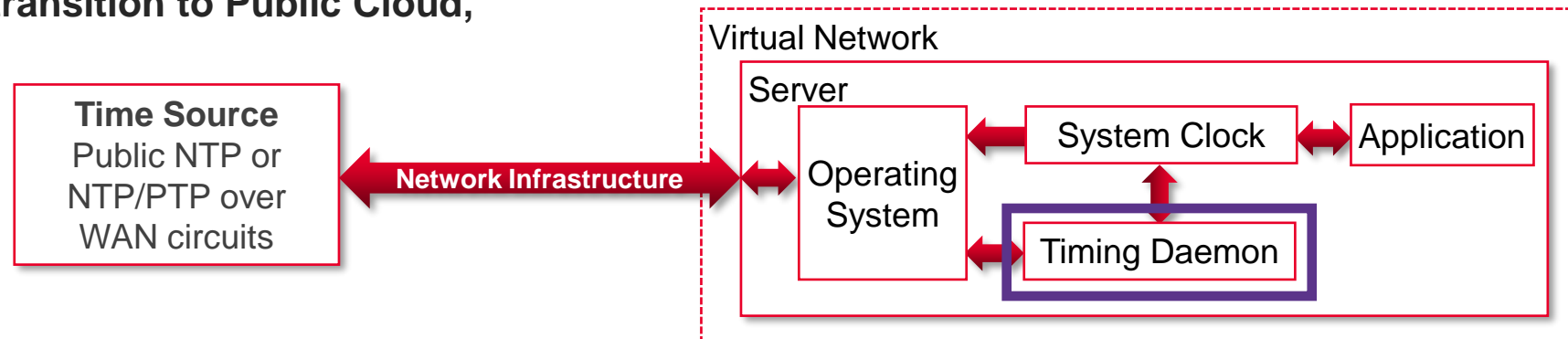
A comparison of three different time synchronization daemons in public cloud environments

# It can be a challenge to know your servers are synchronisation their clocks accurately 100% of the time,

Physical data centers today,



As we transition to Public Cloud,



# Timing Daemon Selection in Public Cloud Environments

## Accuracy and Scalability

- Can the solution be easily deployed across hundreds or thousands of servers with different Operating Systems. Does it synchronize accurately?

## Resilience

- Support for Multiple Time Sources with Automatic Failover

## Reporting

- Ensure that there are no breaks in synchronisation and that tolerances are within boundaries.

## Anomaly Detection

- Monitor your time sources and ensure if an anomaly occurs that it doesn't affect operations

## Audit Trail

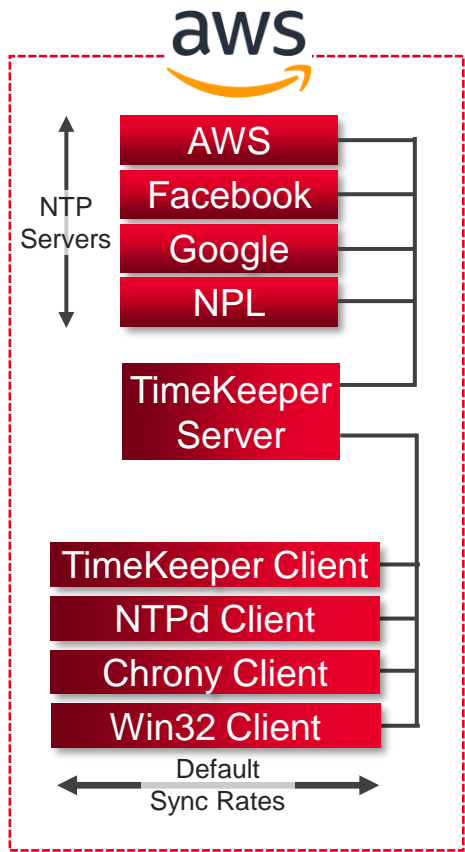
- Is your time really coming from where you expect it to be coming through and can you prove it

## Support

- Commercially Supported Product

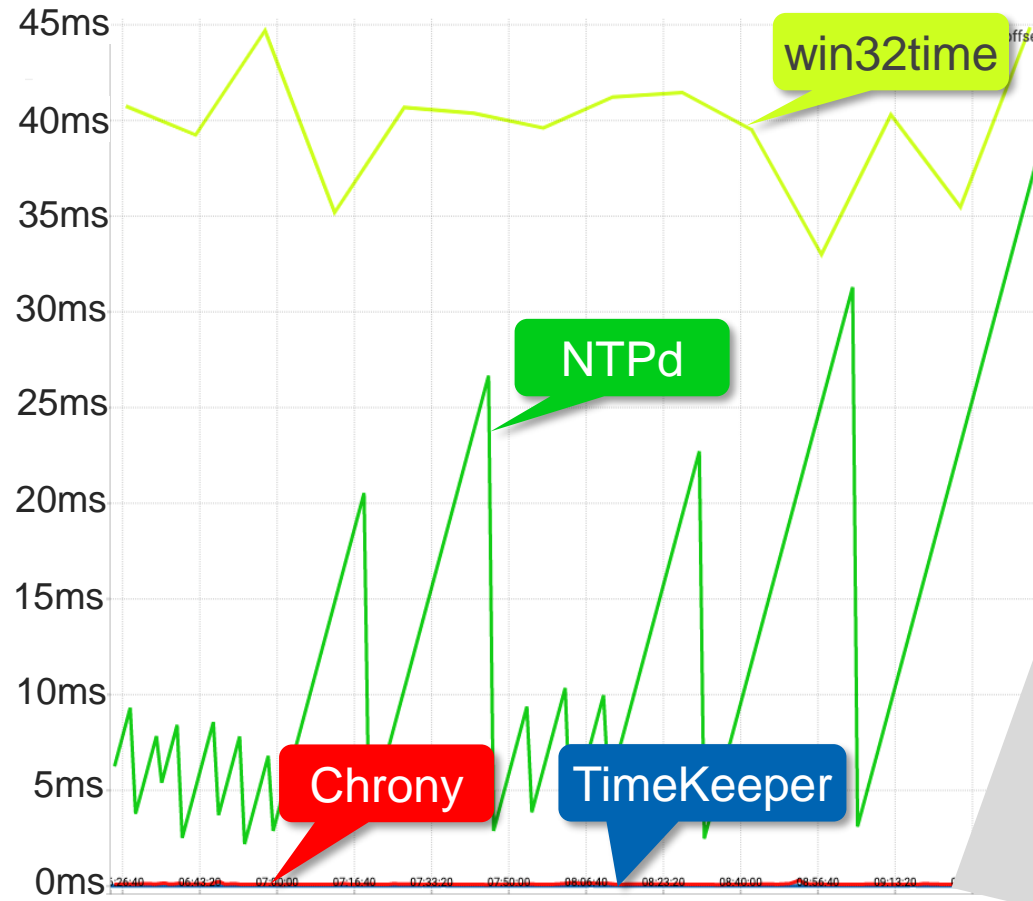
# The are lots of daemons / software packages which you can use to synchronize the clock on your server,

We took three different NTP clients (plus NTPd) and compared the accuracy with their default settings,

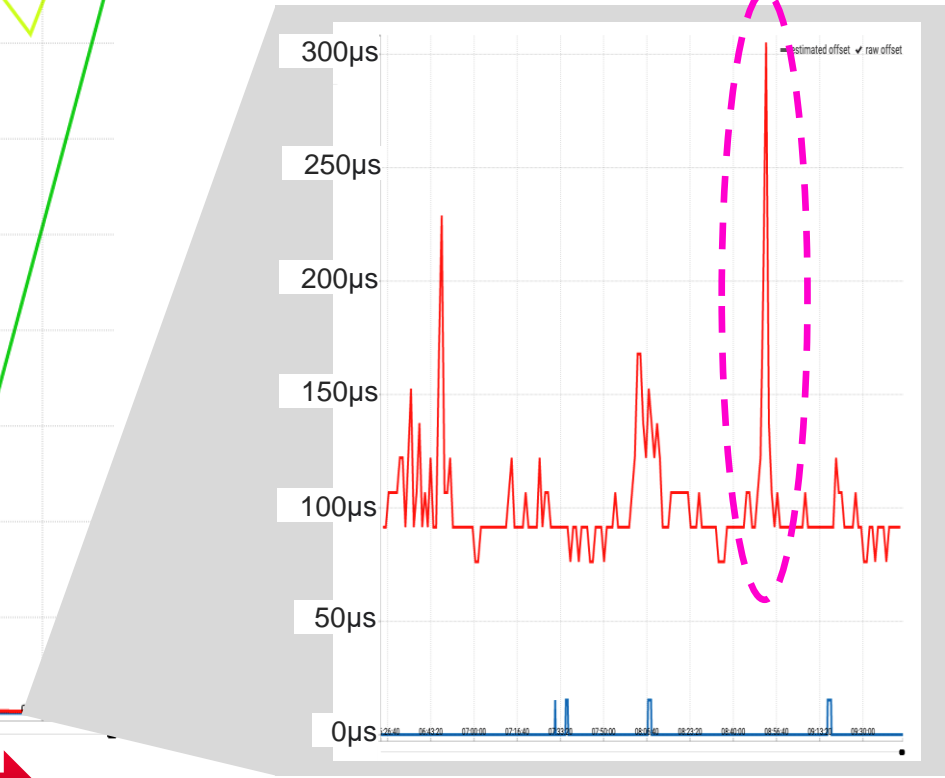


Instance Size: T3 Medium. Sync Accuracy mirrored on larger sized instances.

Not STAC benchmarks



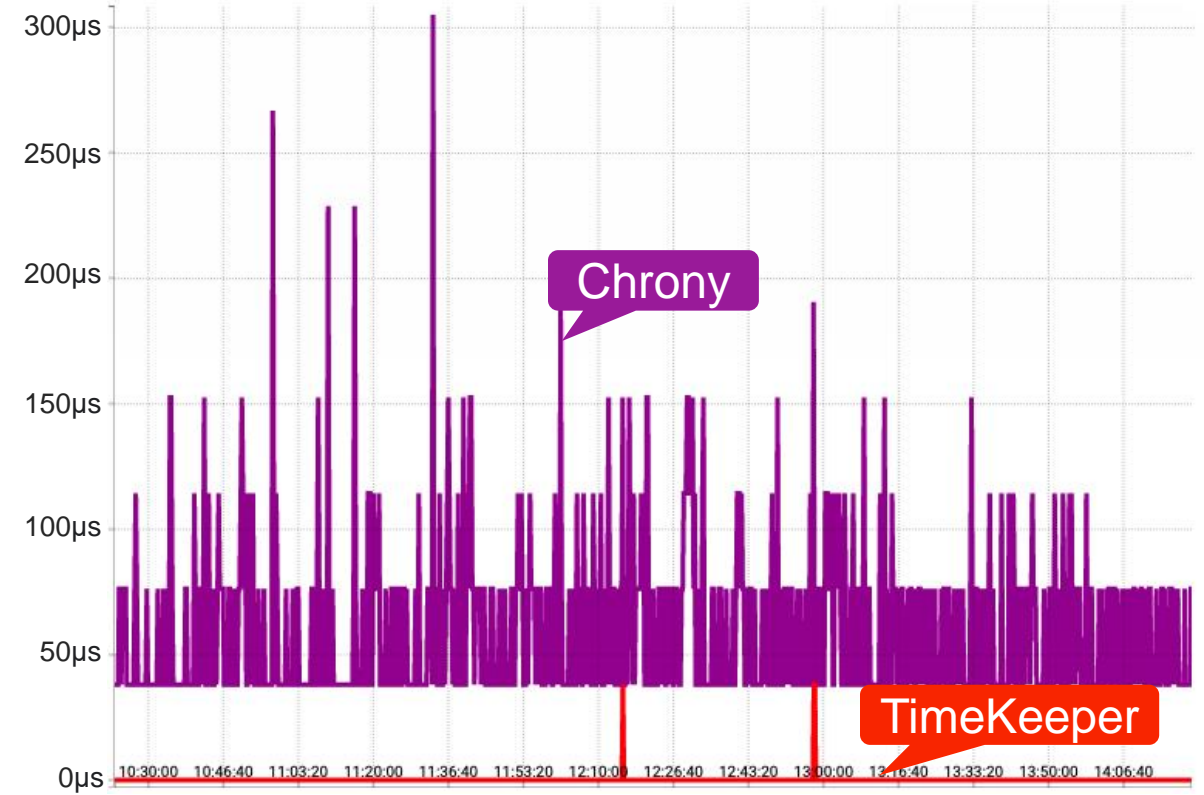
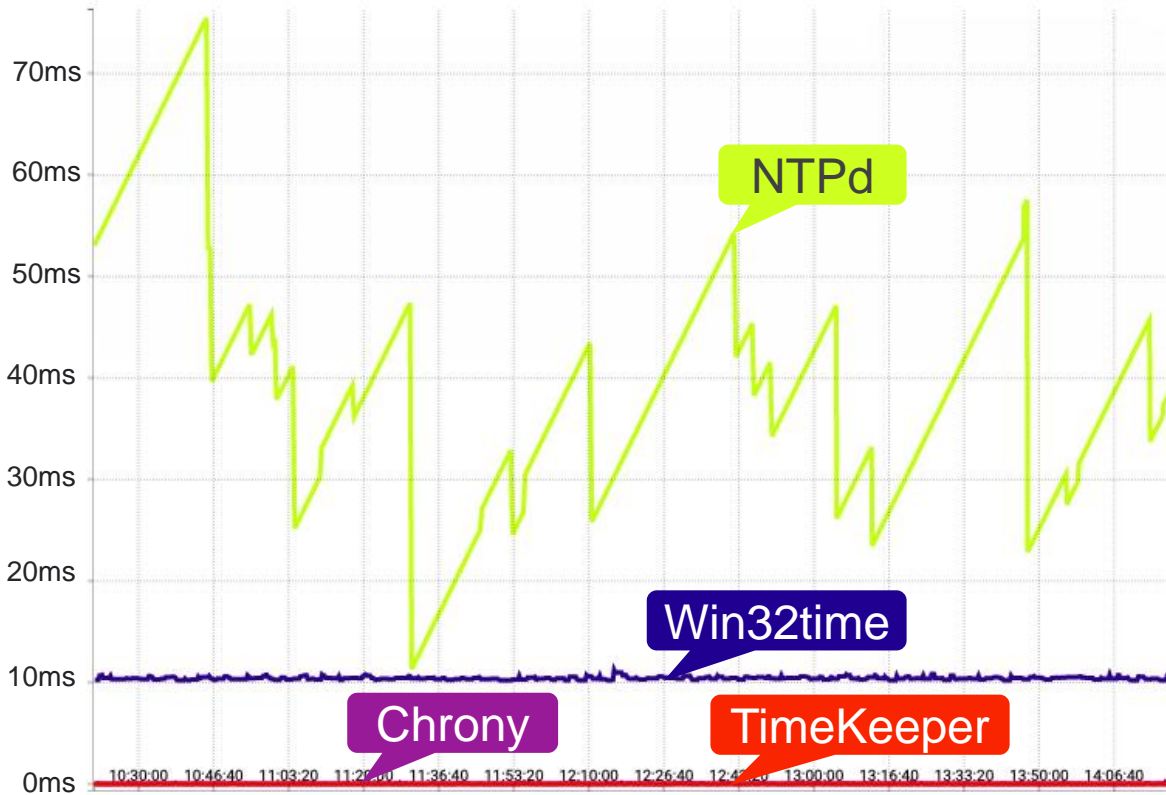
Peaks often as a result of instance migration



From the server



# What happens when we tune the sync frequency

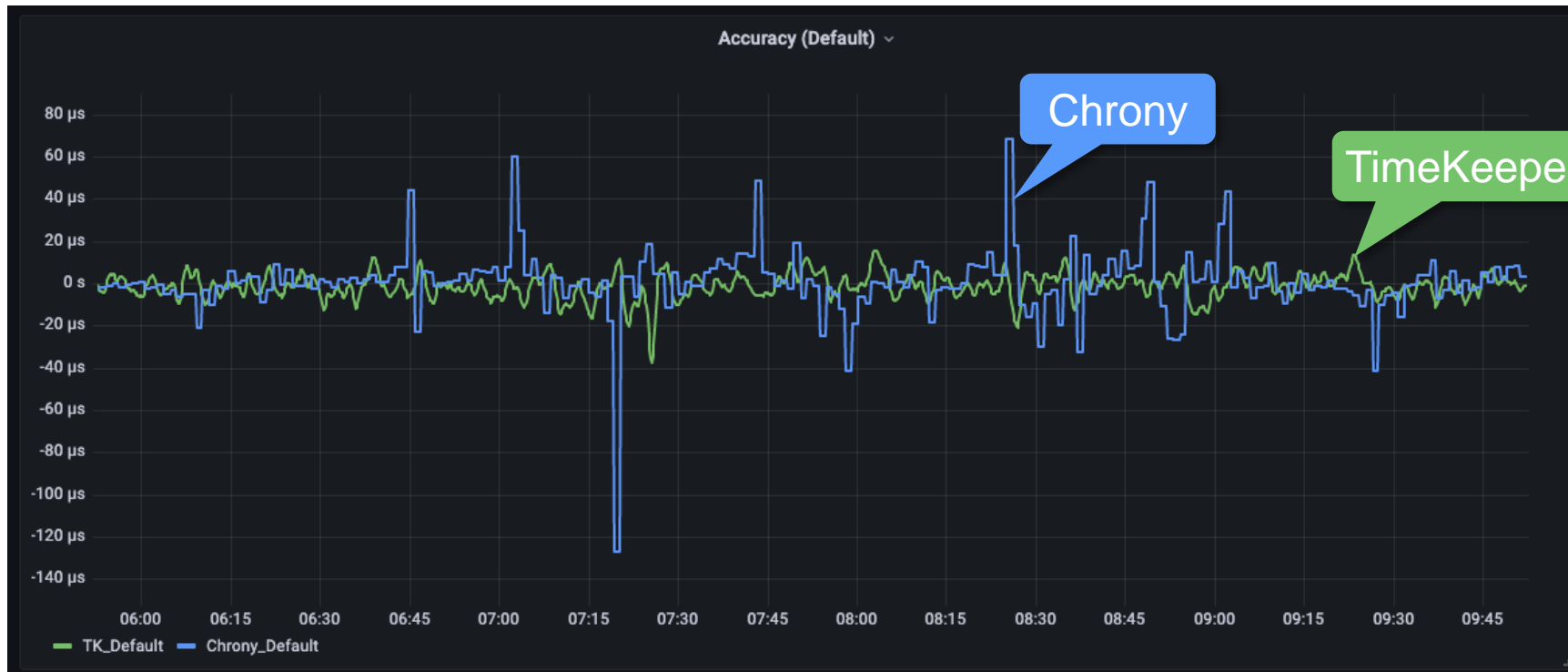


Client / Sync Frequency	Seconds per Sync	
	Default	Tuned
NTPd	64	8
Chrony	64	0.125 <sup>1</sup>
TimeKeeper	1.1	0.125 <sup>1</sup>
Win32Time	900	16

**Not STAC benchmarks**

<sup>1</sup> – Can be configured to sync more frequently but accuracy reduced in testing.

## If we look at the accuracy from the client's perspective



**But Accuracy is just one item  
that needs to be considered...**

# Conclusion

## Timing in public cloud:

- There are lots of to think about when deploying timing in the public cloud.

Feature / Client	NTPd	Chrony	TimeKeeper
Accuracy and Scalability	★★	★★★★	★★★★
Resilience	★★★★	★★★★	★★★★★
Reporting	★★	★★	★★★★
Anomaly Detection	★	★★	★★★★★
Audit Trail – FINRA-MIFID	★	★	★★★★★
Support	★	★★	★★★★★

# Thank you