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Welcome to the Interskill Mainframe Quarterly

Interskill Mainframe Quarterly is a e-Zine published by Interskill Learning, which provides world-class elearning Mainframe training programs for the Information Communications and Technology industry.

As a subscriber to Interskill Mainframe Quarterly you will receive an edition every three months which will include z/OS related articles for technical experts and management, and information on upcoming releases of Interskill’s Mainframe curriculum.

Interskill Learning Releases – 2012

Upcoming Interskill releases will include the following courses:

- A new course introducing cloud computing for data centers
- A new course on security on the mainframe, to complete the Security series
- A new z/OSMF course
- The complete z/OS Series updated to V1.13
- A new course on storage fundamentals for data centers to complete the Storage series
- A new z/OS Utilities series that replaces the old utilities series with new courses on VSAM, general data set utilities, and data utilities
- New courses in the Power series for IBM i operators and administrators
- A new series on project management
Is Your Data Center Career Cloudy?

By Greg Hamlyn

In the first installment of this four part series we discussed what the cloud actually is and described the most popular cloud models and the different types of environments in which they can be deployed. In this article we take what we have learnt about the cloud and see how it will affect data center life and your job role.

Pre-cloud

Before gazing into the cloud to see how it will transform data center jobs, we need to look at the current state of staffing in this area. For many years now, headlines have been touting a skills shortage as a number of experienced mainframers head towards retirement. In the meantime, the 2001 recession resulted in huge budget cuts, many in the IT area that have resulted in largely flat salary budgets to the current day. So, many of the staff today have already survived the ordeals over the last decade meaning that they have proven value to the organization. The shift to cloud computing is really just a continuation of the state of flux that data centers constantly find themselves.

Is there room for you in the cloud?

You don’t need to be Einstein to realize that moving to a public cloud configuration will mean that the job roles directly associated with provisioning, installing and managing previously on-site equipment will be affected. Looking at this positively, if you are involved in these areas, it could be an opportune time to obtain some cloud skills and knowledge because:

- Someone will need to understand the vendor’s infrastructure, and your organization’s processing requirements so that they are matched to current and future needs
- The performance of the vendor’s infrastructure will need to be constantly monitored to ensure it is meeting the needs of your organization
- With processing or storage of data being performed offsite, the security of data will become paramount so if you are a security analyst/manager then expect your job to get a lot busier

New cloud job roles within the Data Center

If a private cloud or hybrid model is implemented, then some chunk of processing will remain in-house and your knowledge of the cloud will need to increase substantially to a point where job roles will either evolve or new ones will be created. Some of these jobs may look like this:

- Cloud Operator - responsible for tasks similar to today’s system operator except that the day-to-day maintenance and monitoring is performed on the cloud environment.
- Cloud Architect - responsible for design-
What Sort of Data Center Job Should You Be Looking For?

By Greg Hamlyn

Everyone will have a different perspective of what is a great data center job. It could relate to advancement possibilities, job security, wages, or just that it is interesting work. In this article we look at a number of criteria to help you nail down the type of data center job you should be on the lookout for.

1. Any job that is long-term!

Sometimes it is hard to keep a step ahead of the technical cull, with automation, technological advancements and outsourcing constantly nipping at our heels. If you are look-

So, what does this mean for you?

No matter what role you currently perform within the data center, the cloud will make it imperative that you obtain skills and knowledge that will make you more marketable if, or when, cloud restructuring hits your neighborhood.

In the next installment of this article we will look at sources that can be used to create your own portfolio of cloud skills and certification.
ing for longevity, then you should consider a data center job along these lines:

Performance – whether your system is on-premise or outsourced, there will always be a need to for someone to be monitoring your system workloads to ensure they are meeting your organization’s standards, and if not, assessing what can be done to improve it. While there continues to be advancements with tools that can gather this information, data still needs to be analyzed and recommendations made.

Programmers – there has always been a need for programmers to create, and update programs for existing or new markets. For instance, the last decade has seen an explosion in web based applications, with the next realm being mobile devices.

Disaster Recovery – If you are involved with this area of expertise then as long as your company is in business they will need someone to plan, coordinate, perform and evaluate disaster recovery activities. I am guessing that most organizations would want this person on the payroll rather than being outsourced to a third party.

Project Managers – Many IT specialists will most likely find long-term positions as technical project managers and take on business analyst roles to advise the organization on its technology needs. A good project manager is always in demand!

2. Working from home.

While you are not likely to find a data center job that allows you to work from home full-time, there are many organizations that provide you with the tools to be able to work several hours from home. If you are in the management field, then writing reports, project plans or recommendations in the quiet (hopefully) confines of your own home are going to be more productive. With today’s mobile technology you can even monitor things such as mainframe performance, many miles from the actual workplace.

3. Working for a company with great perks.

Sometimes it isn’t always about the job. Who you work for and the people that surround you can compensate for a job you are not entirely happy with. Consider organizations that provide benefits such as flexible work schedules, on-site cafeterias and fitness centers, medical insurance, 401k, college admission coaching for your children, and cash reimbursement for outside health club/health equipment/sports expenses.

The design of the data center itself can also have a great impact on job satisfaction…my thoughts turn immediately to the movie “Joe vs the Volcano” where Tom Hanks works in an office where flickering fluorescent lighting is the only source of light.

So, everyone will have a slightly different take on their perfect data center job. Some of you will need to be challenged to investigate and learn about the technology around the corner, while others who are no doubt experts at their jobs, will want things to stay as they are because they are satisfied with their lives.

It’s your call.
z/OS 1.13…What’s in it for Me?

z/OS 1.13 has been out for a while now, so it’s probably a good time to analyze how it can make your life a bit easier. In this article, rather than just spout the features and benefits of z/OS 1.13, we look at what it means to various IT professionals within the data center.

For Operators

Several new and modified operator commands, predominantly dealing with system management, are included with this z/OS release.

Some new JES2 commands have been introduced to manage spool volumes. In an environment where you are now able to dynamically resize volumes, JES2 had been unable to easily expand its single extent spool data sets to take advantage of this feature. Now, operators are able to issue the $TSPOOL command and specify a space value to extend the size of the spool data set. New JES2 commands are also available to migrate and merge spool volumes and as a result, the $DSPOOL command will now display migration and volume mapping details.

If you need to requeue a job at the end of its current step (say for execution on another system) then a STEP parameter can now be used with the $EJ command. An optional HOLD parameter will prevent it from rerunning immediately.

In the past you may have used the z/OS CMDS ABEND command when needing to end an MVS command that is executing. When this didn’t work then often an IPL was required. In z/OS 1.13, an optional FORCE parameter can be used with this command. IBM stresses that this is only to be used when the only other alternative is an IPL.

Looking at SDSF, there are several new panels, panel columns, and action characters available. The new NC and NS panels can be used to display network connections and devices, while new columns of information are displayed on a number of panels to include additional spool volume information mentioned earlier. For those operators who like screens colored so that relevant information is highlighted, the SET SCREEN command can be invoked for the OPERLOG and you can define values to override original message colors and highlighting.

In line with previous releases, JES3 users have a number of new options available within SDSF – INIT (initiators), NO (nodes), LI (Line), PU (Punch), RDR (Reader), H (Held output queue), O (Output queue) and J0, which is a JES3 only panel to display Job 0 information.

For System Programmers

There are a wide range of goodies for the system programmer in this release, ranging from new health checks and recommendations for controlling and managing checks, to enhancements associated with PFA (Predictive Failure Analysis) and Runtime Diagnostics. For example, PFA can now detect a
damaged or hung address space or system before it actually occurs, and invoke runtime diagnostics in an attempt to identify and report on the problem.

IBM has also improved various system recovery processes. For example, if the system detects path errors, it will now immediately remove paths to affected devices so that system performance is not impacted during the normal recovery of the channel path.

IBM have made good on their promise to populate z/OSMF with easy to use, commonly used applications and have included several new items with this release:
- An option to deploy and manage SMP/E packages.
- A new capacity provisioning option, which allows you to request various reports of the status of the Capacity Provisioning Manager.
- Browser interface ISPF session.

**For Application Programmers**

IBM has provided some enhanced interoperability between COBOL and Java with this z/OS release, providing greater coordination between the two when performing DB2 updates. This will allow you to extend the life of your COBOL batch programs using Java.

There are several JCL enhancements that programmers may find useful:
- A new JOB statement parameter called JOBRC can define the return code produced at job end (before this version it was set to the highest return code from any step).
- In-stream data for PROCS is now possible (DD * or DD DATA).
- A FREEVOL=EOV parameter can be specified so that a tape containing part of a multivolume data set can be released at end of volume rather than at the end of the step.

**For Storage Administrators**

There are a load of new DFSMS related features in this z/OS release. The z/OSMF product mentioned previously contains a new DASD Management task, which can be used to display and add volumes to a pool storage group, and view reserved storage pools.

Larger Extended Address Volumes are possible with z/OS 1.13 (now 1 TB compared to a maximum of 223 GB in the previous z/OS version). That’s a lot of space but if you consider that data storage requirements are growing around 40% - 50% per year, it won’t take long to fill. The system now allows larger data sets to be created and longer retention periods to be defined (93000 days).

**For Organizations**

IBM has announced that its z/OS releases will now occur every 2 years (starting with a version 2 in the second half of 2013). By upgrading to new releases every two years, organizations will get the chance to fully exploit enhancements and not miss out on updates like they would if they were updating their system every second release (approximately only 5% of organizations update to the latest z/OS release every year, while the majority tend to skip a version). There will be more information on this topic in future editions of this newsletter.

So as usual, there are improvements on a number of levels. Some will affect you greatly and others may resolve issues that you have had with previous z/OS versions, while some other items will just make your life that little bit easier.
Vendor Briefs

Since my last update it seems like vendors have been listening to the struggles that customers have been enduring and have released a wide range of products that address items such as data in the social media, consolidated systems and smarter cloud management. Here is a brief run-down on what the major players have been up to.

IBM

PureSystems – IBM, as a result of acquisitions and four years of development, has announced the release of their PureSystems family of expert integrated systems. What IBM have brought to the table is consolidated Intel and Power hardware that is capable of running AIX, Linux, IBMi and Windows, so customers can match their workloads to the system best suited. The equipment itself (server, storage, and networking) is housed in a modularized box that allows for any component to be easily replaced without disrupting processing.

You may think that much of this is similar to what the zEnterprise can do, and you would be right. The main difference obviously is that zEnterprise also accommodates the z/OS operating system, as well as the security and governance associated with this environment. So, these two hybrid systems have been created to satisfy the distributed and mainframe needs of many businesses, but can they exist in parallel? IBM mentions that the zEnterprise and PureSystems environments can be networked together and I would expect in the not too distant future that they will become even more closely integrated.

Look forward to more news on PureSystems in our next newsletter.

Business Analytics - The management of ever increasing organizational data and its analysis is at the top of many IT executive’s lists. IBM has recently released Infosphere Warehouse 10, which with DB 10 can be used to provide an increasing number of internal users with data analytical capabilities. These products combine to also provide high levels of automatic data compression and
placement of data on the most suitable storage medium while allowing for quick access to it if required.

**Cloud** - The management of increased number of virtualized images that are being moved into cloud environments is becoming a headache for IT administrators. As a result, IBM has recently released some additions to its SmartCloud family of offerings:

- **IBM SmartCloud Monitoring** - provides administrators with the ability to monitor and analyze virtual infrastructures in the cloud.
- **IBM SmartCloud Virtual Storage Center** - provides management and administration of multi-vendor virtualized storage.
- **IBM SmartCloud Control Desk** - provides incident, problem, change, configuration, release, and IT asset management across the ever increasing range of today's IT landscape.
- **IBM Endpoint Manager for Mobile Devices** - provides management and security aspects relating to employees mobile devices.

**CA**

Data Management - CA Technologies have recently released several new products as part of its CA Erwin family. These solutions address various issues associated with the complexity of managing data across on-premise and cloud environments. These new products include:

- **CA ERwin Data Modeler for SQL Azure** - provides the ability to identify and classify data assets, migrate data to cloud based SQL Azure, and maintain those databases using familiar modeling paradigms.
- **CA ERwin Web Portal** - provides technical and business users with a graphical view of the metadata information that describes the business context of data assets.

**Cross Platform Application Management** – Earlier in the year CA Technologies released CA Cross-Enterprise Application Performance Management (APM), which is able to track and manage transaction performance running on a physical, virtual or cloud environment. Information is displayed using a Windows interface, while the CA Mainframe Application Tuner component allows your support or application staff to quickly identify and resolve application code issues.

**May Mainframe Madness** – While writing this newsletter article it is May, which is not only important because it is my birthday, but also marks CA Technologies May Mainframe Madness 2012, where there are live sessions, product demos, and whitepapers delivered each working day of the month. Much of the content remains online after the event, and is worth taking the time to register to gain access. Check out this link for more information: [http://www.ca.com/us/lpg/may-mainframe-madness/may-mainframe-madness-2012.aspx](http://www.ca.com/us/lpg/may-mainframe-madness/may-mainframe-madness-2012.aspx)

**BMC**

Cloud – Like other major vendors, BMC has recognized the need for customers to be able to monitor and manage exactly what is happening with their applications in the cloud. As a result, BMC has recently released BMC End User Experience Management OnDemand, which uses an SLA perspective to measure the customers dealing with an application that is based in the cloud, as well as the performance and availability of that web application overall.
Tech-head Knowledge Test

Usually our Tech-head knowledge test relates to a product that you are most likely using in your environment. This release is a little different in honor of IBM who is making their z/OS IBM System z and z/OS Fundamentals Mastery Test available free to members of the Academic Initiative System z program and their students.

The link below provides 15 questions mapped to the “Introduction to z/OS and the Mainframe Environment” objective associated with IBM’s mastery test mentioned above. Click the link below to start.

[Introduction to z/OS and the Mainframe Environment Practice Assessment]

Note: Datatrain customers have access to sample assessments relating to all four objective items that form IBM’s z/OS IBM System z and z/OS Fundamentals Mastery Test.

Learning Spotlight – VSAM

VSAM has been with us since the 1970’s, providing Data Centers with not only a data access method, but also with several types of data sets with their own unique methods for reading and writing data. Throughout the years various enhancements such as data compression, record level sharing, and data striping have enabled VSAM to survive and flourish within the data center environment.

The module that we have provided for you here is VSAM Basics, which describes VSAM features and the structure of various types of VSAM data sets.

We hope you enjoy it.

management: Five Minute Guide to Omegamon

By David Stephens, Lead Systems Programmer at Longpela Expertise

You’d think it would be simple, but Tivoli’s Omegamon XE monitoring products are anything but. As you work through the Omegamon maze you will see names like Omegamon XE, Omegamon DE, Omegamon II and Omegamon Classic.

Even the displays can be different: CUA, Classic or TEP. Not to mention Omegamon agents and the Omegamon Management console. So you can be forgiven for being confused about Omegamon. This month, we provide the definitive five minute guide to Tivoli Omegamon XE.
Omegamon Classic

In 1975, Aubrey Chernick began developing a product to monitor MVS. He saw that MVS had nothing to show a clear picture of performance, or to easily determine performance problems. In some cases MVS also missed tools that were very handy when administering MVS systems. His solution: Omegamon. His company, Candle Corporation became one of the largest providers of performance measurement software for the mainframe. By the time Candle was acquired by IBM in 2004, it had 3000 customers in 50 countries, including 83% of the Fortune 100. Omegamon was accessed from a 3270 screen – logged on from a VTAM application, accessed from ISPF or displayed continuously from a dedicated VTAM terminal. It provided screens to quickly see MVS performance and problems, like the one below.

Omegamon quickly became a favorite of Systems Programmers around the world. Omegamon provided screens that would clearly show any potential problems, like the Omegamon for CICS screen above. Application and task performance could be seen, and basic performance metrics analyzed. But Omegamon went further than that. It provided a raft of tools to allow Systems Programmers do anything from modifying memory to dynamically adding SVC routines.

Omegamon also provided an Application Tracing Facility (ATF) for tracing problem tasks. Omegamon wasn’t limited to MVS. After the success of its original Omegamon, Candle released monitors for IMS (Omegamon/IMS), CICS (Omegamon/CICS) and DB2 (Omegamon/DB2).

Today, Omegamon Classic can still be found in Omegamon XE for z/OS, IMS, CICS and DB2.

Dexan, RTA and Epilog

As Omegamon matured, Candle released other products to enhance its original Omegamon family, products that are all included in today’s Omegamon XE.

Dexan

Dexan is a z/OS bottleneck analysis tool similar to RMF Monitor III. Point it at an address space, and it will show why that address
space is waiting, and other address spaces impacting it. It regularly samples the address space, searching for delays like I/O, enqueue, tape mounts, paging, swapping, JES, HSM or CPU. DEXAN/IMS does something similar for IMS workloads.

RTA

The Response Time Analyzer (RTA) breaks down the response time of workloads into individual components in real-time. From these screens, programmers can target the component slowing things down, and work to fix it. RTA is available for z/OS (RTA/MVS), CICS (RTA/CICS) and IMS (RTA/IMS).

Epilog

EPILOG is the historical part of it all. It can store the information collected by Omegamon, DEXAN and RTA, and save it for later. The data can be analyzed from batch or an ISPF interface.

ETE

The Omegamon End-to-End product (ETE) showed the application response time as seen by a VTAM end-user, including processing and network times.

Omegamon II

The original Omegamon products were very powerful, but were command driven. You would normally need to know a 4-5 character command to get the screen you were looking for. Although Omegamon did provide a basic menu structure, many customers found it too hard to use. So Candle produced an add-on to Omegamon in the 1990s: Omegamon II. Omegamon II was still a 3270 interface, where customers would logon to a VTAM application (no ISPF command this time). However it provided an easier menu system; including drop-down menus, pop up screens and clearer displays. Candle called this the Common User Access, or CUA. Here’s an example of an Omegamon II for CICS screen:
Omegamon II still needed the classic Omegamon: in reality it was only a new face for Omegamon Classic. Omegamon II actually issued Omegamon Class commands under the covers. You can see these commands by following IBM Technote 1222528. Omegamon II also provided a gateway to the classic Omegamon interface for those preferring it.

Originally sold as a separate product, Omegamon II was eventually packaged together with the classic Omegamon as Omegamon II. Today, Omegamon II is also included in Omegamon XE. New Omegamon products introduced by Candle in the 1990s were only released with the CUA interface – no Classic option. This is why products such as Omegamon XE for Mainframe Networks and Omegamon XE for Storage don’t have a Classic interface.

**Omegamon XE and DE**

3270 screens are fine, but by 2000 Windows and Graphic User Interfaces were more popular. In 2001 Candle announced Omegamon XE (Extended Edition): a Java interface for all of its Omegamon products. Omegamon XE used a local IRA (Intelligent Remote Agent) or OMA (Omegamon Monitoring Agent) on z/OS to send information back to a central server called the Candle Management Server (CMS). The CMS would process this information, and hold it ready. The Candle Net Portal Server (CNPS) performed the central processing to allow users to display this information, and Candle Net Portal clients (either a Java client program or web-browser interface) showed this to users.

At the same time Omegamon DE (Dashboard Edition) was also announced. Omegamon DE allowed information from multiple Omegamon monitors, as well as other sources, to be seen and processed together in a single view.

Today, this is all included in IBM Tivoli Monitoring. The CMS is now TEMS, the CNPS now TEPS and the Candle Net Portal client TEP. Omegamon XE TEP screens today look like the Omegamon XE for Websphere MQ screen below. You can find out more about ITM in our article *The Basics About ITM*.

A conversion to APPN may also face many of the problems of a conversion straight to TCP/IP. It is difficult to choose APPN over TCP/IP without large savings or other benefits.

**Omegamon XE Today**

Today, any z/OS customer buying Omegamon XE gets it all. If you buy Omegamon XE for z/OS, you get:

- Omegamon Classic for z/OS
- Omegamon II for z/OS
- Omegamon XE agent for z/OS
- IBM Tivoli Monitoring – the framework for processing Omegamon data and viewing it in a GUI
- DEXAN, RTA, ETE and Epilog

This can cause some confusion. Omegamon XE is sometimes used to refer to the Omegamon agent that communicates with ITM, and sometimes to all Omegamons: Omegamon XE, Omegamon II and Omegamon Classic.

To make things worse, not all Omegamon XE products include an Omegamon Classic or Omegamon II component. Some Omegamon products such as Omegamon XE for Networks and Omegamon XE for Storage only have an Omegamon II component. Even more recent products such as Omegamon XE for Messaging and Omegamon XE for Websphere Application Server have no Omegamon Classic or Omegamon II component –
just the Omegamon XE agent.

Some Omegamon XE products amalgamate traditional Candle products with existing IBM products. For example, Omegamon XE for Mainframe Networks includes Candle’s Omegamon for Mainframe Networks and IBM’s Tivoli Monitoring for Network Performance. Omegamon Classic and Omegamon II don’t need ITM or an Omegamon XE agent to run. Users can still logon to the 3270 applications like they always have. However Omegamon XE agents usually use Omegamon Classic and Omegamon II. For example, Omegamon XE for CICS, IMS and z/OS all need their respective Omegamon II and Omegamon Classic processes running.

Omegamon Monitoring Console

The Omegamon XE Monitoring Console (OMC) is a free, cut-down version of Omegamon XE for z/OS. On z/OS, OMC runs as an Omegamon XE monitoring agent, and has a local hub TEMS running alongside. On the PC side, it has the usual TEPS framework running on a PC. OMC doesn’t use Omegamon Classic or Omegamon II – the Omegamon agent is all it needs.

OMC doesn’t provide a lot of monitoring options – it has around 10% of the full Omegamon XE functions, predominantly Sysplex oriented. It also provides a GUI front-end to the IBM Health Checker. OMC could be seen as a free sampler for Omegamon XE for z/OS.
Conclusion

For z/OS, DB2, CICS and IMS; Omegamon XE is really three separate products: Omegamon Classic for the basic functionality, Omegamon II for more sophisticated 3270 screens, and Omegamon XE for the monitoring agent and tasks that work with ITM for GUI access. More recent Omegamon products do not have a Class component, or even an Omegamon II component in some cases. Omegamon Classic and Omegamon II do not need the ITM infrastructure or extra monitoring agents. However the Omegamon XE agents usually need their corresponding Omegamon Classic and Omegamon II tasks.

David Stephens
Source: Longpela Expertise, LongEx Mainframe Quarterly –May 2012
http://www.longpelaexpertise.com/ezine/OmegamonFiveMinutes.php

technical: z/OS Tracing for Beginners

By David Stephens, Lead Systems Programmer at Longpela Expertise

One of the best kept secrets about z/OS are its tracing features. z/OS comes with free, powerful tracing features that in many ways match those of expensive monitoring products. In this article, we look at the z/OS tracing options.

System Trace

Got an abend, and want to know what was happening just before it? You need the z/OS system trace. The z/OS system trace is a trace that tracks basic z/OS events, things like:

- SVC calls
- Abends
- I/O to disk or tape
- Cross Memory calls

The good news is that the system trace does not use up much CPU, and it is always on; there is no way to turn it off. System trace entries are recorded in the trace address space, and included in any system dump – including an SVC dump and SYSMDUMP. To look at system trace entries, you can use IPCS to analyze an unformatted dump, or browse a formatted dump (like SYSUDUMP). The IPCS SYSTRACE command formats the system trace entries, producing something like this:

```
---------------------------------------------------
| SYSTEM TRACE TABLE ---
|--
|--
| PR ASID WU-ADDR- IDENT CD/D PSW----- ADDRESS- UNI
| 00-004C 008EA818 SVC 1 078D1000 815c684A 815c684A 815c694A 0005BB0 00000001 FFFAA150
| 00-004C 008EA818 SVCR 1 078D1000 815c684A 815c684A 815c694A 808DD798 00000001 FFFAA150
| 00-004C 01E8A508 SRB 1 070C0000 815c694A 815c694A 815c694A 0000003E 11089E00 11089E2C 008ABCE0 80
| 00-004C 00000000 SSRV 2 815c6968 815c6968 815c6968 815c6968 00069350 7F000000 00000000 00000000

```
System Trace

At first glance this looks daunting, but it’s not that difficult to understand. The system trace works on every processor, and then merged together. So you’ll see the processor ID in the PR column. The date and time is also shown, as well as the event. In this case, you can see events such as SVC 1 (Wait), SRB an SRB was scheduled), and SVCR (return from SVC). You may also see SVC D for an abend (SVC 13) – this is the actual abend itself.

The IPCS SYSTRACE command will format the entire system trace, which will be very large. Most users will want to use the IPCS SYSTRACE ASID(xxx) to limit the traces to a specific address space. IPCS also has a panel to selectively format the system trace.

The system trace can also be setup to trace any branches (BASR, BALR, BASSM and BAKR) using the z/OS TRACE console command. Branch tracing is expensive – your entire CPU usage will jump dramatically. In reality, you will never use this.

You can find out more about the system trace from Jerry Ng’s excellent presentation at the August 2011 SHARE conference.

The z/OS Diagnostic Tools and Service Aids manual gives all the information about the system trace, and how to read it.

Master Trace

The master trace is a trace of recently issued z/OS system messages. It is automatically activated, but can be turned on and off using the z/OS TRACE console command. It is a good idea, and standard practice to leave the master trace running at all times – it doesn’t use much CPU.

The master trace is really helpful when determining what was happening in the z/OS system just before an event. For example, finding out if any errors occurred just before an abend. The master trace is included in any system dump. IPCS is the weapon of choice for seeing master trace entries – using the IPCS VERBEXIT MTRACE command to format the entries.

Generalized Trace Facility (GTF)

If you need more detail than the system trace gives, GTF is the next tool to pull from your toolbox. GTF is an incredibly powerful tracing facility. GTF doesn’t run by default, and that’s because it uses a lot of CPU to run. GTF is only run for short periods to analyze a problem, and then stopped.

By default GTF records pretty much the same information as the system trace, but in less detail. But GTF has facilities to tailor exactly what will be traced: which events, which tasks and which address spaces. For example, you can trace any abends or I/O operations for an individual job. Some z/OS components also can send trace information to GTF. For example, GTF can trace every VTAM operation, or every dataset open and close. GTF can also be setup to trace any storage getmain or freemain – a very handy tool for diagnosing storage problems. This special purpose GTF trace is called the Getmain Freemain Storage trace, or GFS trace, and is activated using the TRACE command, or from DIAGxx parmlib members. GTF’s tracing features step up a gear when used with z/OS SLIP traps. SLIP traps can be setup to trap events such as when an abend occurs, a range of addresses in storage is accessed, or a certain module (or part of a module) is executed. This SLIP information can be recorded by GTF. However these facilities should be used with caution – they will use
up a lot of CPU.

User programs can also use the power of GTF. The z/OS GTRACE macro can be used to send trace entries to GTF (if it is running). Some program products use this as a tracing mechanism for problem determination.

GTF is started as a started task – started with the z/OS START command, stopped with the STOP command. Data collection parameters are in SYS1.PARMLIB, or set by replying to the GTF outstanding z/OS message when GTF starts. GTF Trace entries are written to storage in the GTF address space (less expensive) or to a dataset on disk (far more expensive). GTF data in storage can be included in any system dump, and formatted from IPCS using the IPCS GTFTRACE command. GTF VTAM commands are formatted using the VTAM ACF/TAP program.

The z/OS Diagnostic Tools and Service Aids manual is the place to find out all about GTF, and how to read the GTF output.

Component Traces

Component traces are component-specific traces that are intended for use by vendor support staff. Although not intended for normal use, they can be handy on the rare occasions when you need to know a little more about what is happening under the covers. The component trace is really a z/OS facility that any software product can use – though currently the main users are z/OS components.

The z/OS D TRACE command shows the component traces that are active. z/OS has many component traces that are active by default, and it’s a good idea to leave these as they are. These default values are usually efficient and don’t use up much CPU.

Adding extra component traces can be very expensive, and should only be done if your vendor’s support staff request it, and turned off soon after. They are activated using the z/OS CT command, with options and parameters in SYS1.PARMLIB members. Component traces are formatted and viewed from IPCS using the IPCS CTRACE command. TCP/IP is an example of how component traces can be handy. When performing TCP/IP problem determination, network engineers may need to start an IP packet trace: a component trace specific to TCP/IP.

Transaction Trace

The transaction trace is a relatively new z/OS feature designed as a central point for tracking application units of work that run on more than one system. For example, an IMS transaction that accesses IMS databases in a remote IMS subsystem. It doesn’t provide a lot of detail, but is useful to find out where a unit of work was processed. Transaction trace entries are viewed from IPCS using the IPCS CTRACE COMP(SYSTTRC) command.

Conclusion

It’s easy to forget about the z/OS trace options – you’re not going to use them very often. However these options are really powerful, and can be invaluable when you have that difficult problem to figure out. IBM manuals hold the information you need in a format that isn’t too difficult to read. Redbooks such as the z/OS Diagnostic Data Collection and Analysis can also help.

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Source: Longpela Expertise, LongEx Mainframe Quarterly –May 2012
http://www.longpelaexpertise.com/ezine/TraceBeginners.php
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