Building a Strong Foundation When You're New to z/OS Performance

z/OS Performance
Education, Software, and
Managed Service Providers

Creators of Pivotor®

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Abstract

Building a Strong Foundation When You're New to z/OS Performance

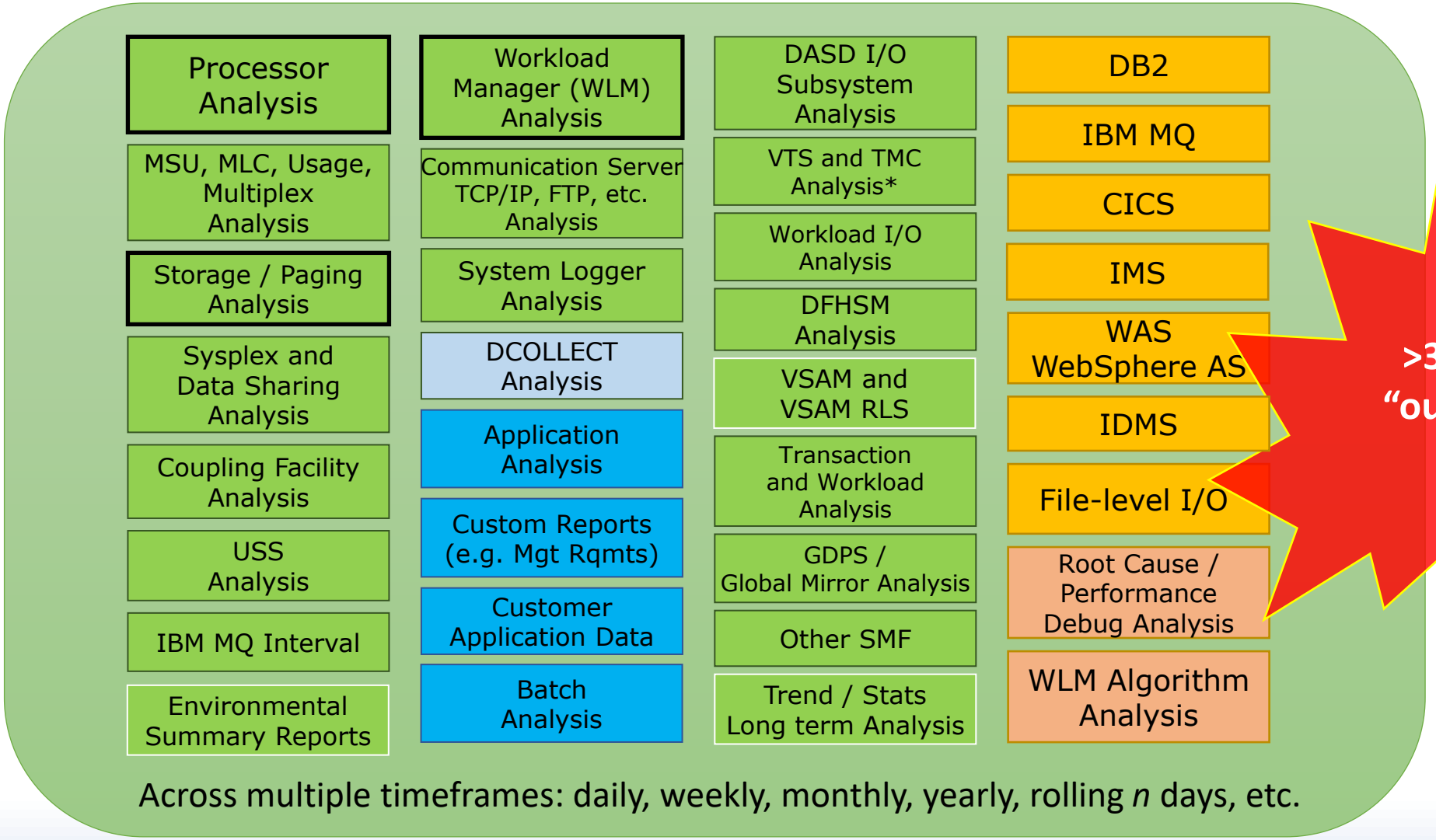
Over the years, we've tried to accumulate new topics to feature in our webinars by asking our attendees what they want to see. Looking back at the ideas we've received, there were many that mentioned something about either being new to the mainframe/z/OS performance or an interest in mentoring and training new staff. Overall, most respondents were looking for some general advice.

During this session, Scott Chapman and Peter Enrico will share some of their ideas for how they'd recommend beginners learn about their environment, grow their skills, improve the z/OS systems under their care, and ultimately enhance their careers.

EPS: We do z/OS performance…

- Pivotor - Reporting and analysis software and services
  - Not just reporting, but analysis-based reporting based on our expertise
- Education and instruction
  - We have taught our z/OS performance workshops all over the world
- Consulting
  - Performance war rooms: concentrated, highly productive group discussions and analysis
- Information
  - We present around the world and participate in online forums

Comprehensive Report Sets for Immediate Performance Analysis



z/OS Performance workshops available

During these workshops you will be analyzing your own data!

- Essential z/OS Performance Tuning
  - March 30 – April 3, 2026 (4 days, excl Wednesday the 1st)
- WLM Performance and Re-evaluating Goals
  - July 27 - 31, 2026 (4 days, excl Wednesday the 29th)
- Parallel Sysplex and z/OS Performance Tuning
  - May 12-13, 2026
- Also… please make sure you are signed up for our free monthly z/OS educational webinars! (email contact@epstrategies.com)

Like what you see?

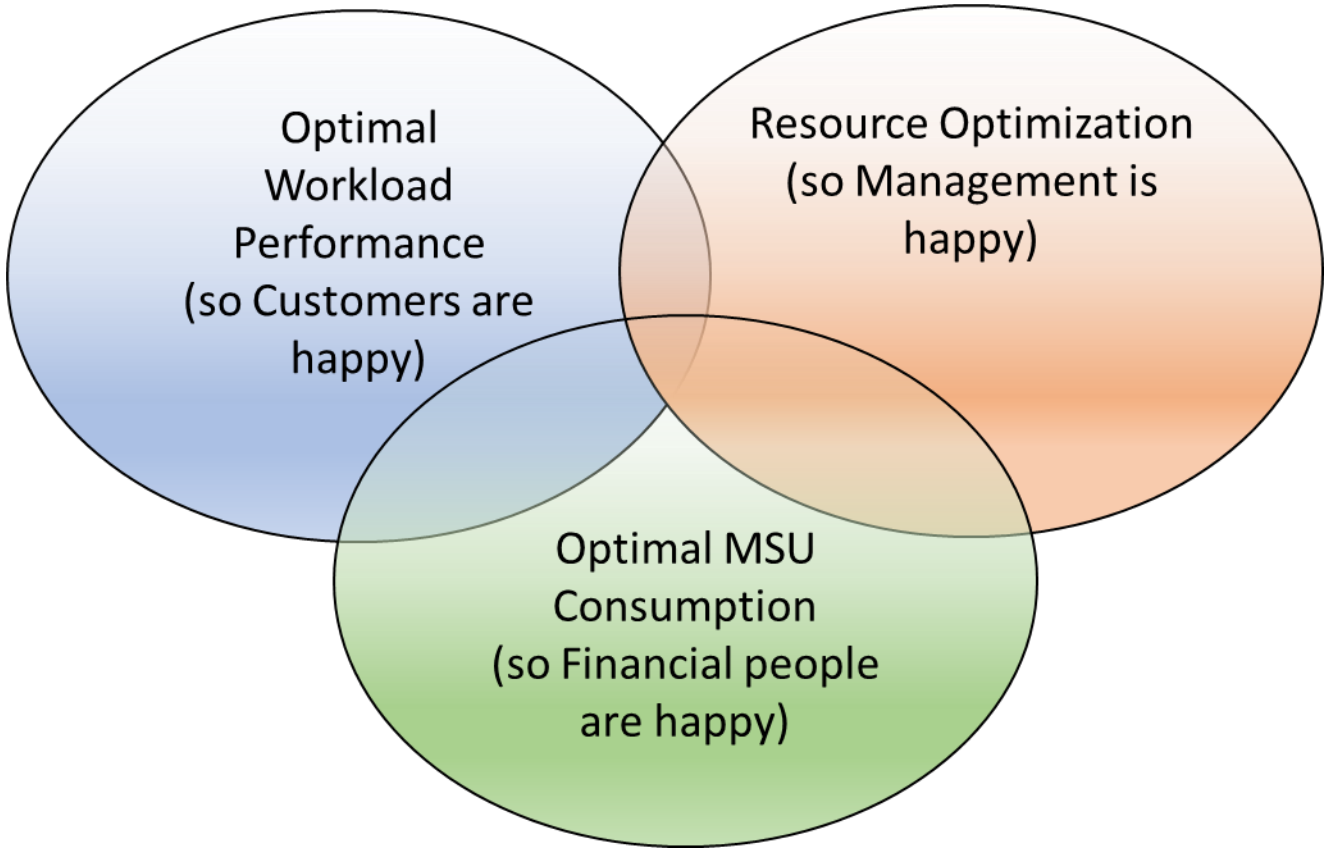
- The z/OS Performance Graphs you see here come from Pivotor™

- If you don't see them in your performance reporting tool, or you just want a free cursory performance review of your environment, let us know!
  - We're always happy to process a day's worth of data and show you the results
  - See also: http://pivotor.com/cursoryReview.html

- We also have a free Pivotor offering available as well
  - 1 System, SMF 70-72 only, 7 Day retention
  - That still encompasses over 100 reports!

The Performance Balancing Act

- Performance on z/OS is about finding an optimal balance among 3 areas



Mainframe Performance Disciplines

- Mainframe performance is a very general term, but a series of disciplines of which make up the field of study

- You may be responsible for all
  - Capacity Planning and Procurement
  - Performance Administration
  - Performance Management
  - Performance Analysis
  - Performance Measurement, Reporting, and Monitoring
  - Performance Tuning and Resource Optimization
  - Performance Engineering, Design, Algorithm Efficiency
  - Performance Testing, Evaluation, and Benchmarking
  - Performance Instrumentation and Measurement Architecture

- Mastering any single discipline could take an entire career

A general outline to help structure your approach to get started

- Each ‘to do’ here should be understood in the context of computer performance
  - Understand the business and the applications supporting the business
  - Understanding / inventory managed resources
  - Understanding / inventory workloads and their requirements (and how they relate to the business)
  - Understanding and managing performance objectives
  - Knowledge and usage of performance controls
  - Ability to measure, monitor, and report
  - Common methodologies and techniques
    - For Capacity Planning
    - For Performance Management
    - For Performance Analysis
    - For Performance Tuning
  - Documentation and communication

Understand the business - Who do you work for?

- *Capacity Planning* is all about ensuring the business has adequate computing resources when they need them
  - Generally focused on long term planning
- *Performance Management* is about ensuring the business can, and is, functioning adequately within the provided resources & constraints
  - Generally focused on shorter term problem determination and resource optimization
- Either way: what matters is that the ***business*** is getting the service it needs
  - You should understand the business (especially for capacity planning)
  - Link Business functions -> Applications -> Technical Resources

Understanding your managed resources and workloads

If you are new to performance, or if you are taking on a new performance responsibility, one of the first things to do is learn about your environment and workloads.

It is a great way to dip your toes in the waters

Note: Most installations already have such configuration sheets

Inventory Your Managed Resources

- The physical resources have huge implications performance and capacity

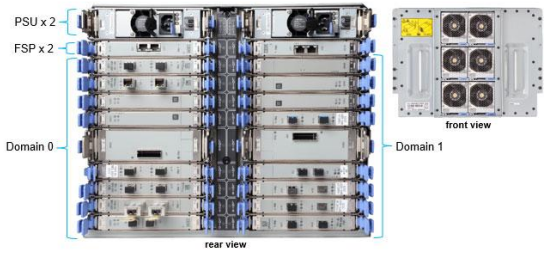
- Eventually, everything runs here
  - Processors
  - Storage controllers
  - Tape controllers
  - I/O cards, zEDC, cards, OSA cards, crypto cards, e
  - Links and channels

- Learn the details, and if possible, the performance characteristics of each
  - Not just what is there, but also the capacities and capabilities of the areas that impact the areas of your analysis
    - Example: Types and capacity of processors
    - Example: How much storage? How does it work?
  - Who are the vendors?

Processors

Storage Controllers

VTS Devices



Lots of cards and adapters

Use measurements to learn configuration

- Many standard measurement reports will help surface configuration details

P A R T I T I O N D A T A R E P O R T

PAGE

z/OS V2R4 SYSTEM ID SYSA DATE 09/03/2024 INTERVAL 09.59.999
RPT VERSION V2R4 RMF TIME 15.10.00 CYCLE 1.000 SECONDS

MVS PARTITION NAME	SYSA	PHYS PROC NUM	35	GROUP NAME	GRPA01	INITIAL CAP	NO
IMAGE CAPACITY	700	CP	11	LIMIT	700	LPAR HW CAP	NO
NUMBER OF CONFIGURED PARTITIONS	20	IFL	18	AVAILABLE	254	HW GROUP CAP	NO
WAIT COMPLETION	NO	ICF	3			ABS MSU CAP	NO
DISPATCH INTERVAL	DYNAMIC	IIP	3				

---------- PARTITION DATA ----------									-- LOGICAL PARTITION PROCESSOR DATA --				-- AVERAGE PROCESSOR UTILIZATION PERCENTAGES		
			----MSU----		--CAPPING---		--PROCESSOR		----DISPATCH TIME DATA----		LOGICAL PROCESSORS ---		PHYSICAL PROCESSORS --		
NAME	S	BT WGT	DEF	ACT	DEF	WLM%	NUM	TYPE	EFFECTIVE	TOTAL	EFFECTIVE	TOTAL	LPAR MGMT	EFFECTIVE	TOT
SYSA	A	N 550	0	209	N N N	0.0	8.0	CP	00.26.19.376	00.26.29.563	32.90	33.12	0.15	23.93	24.
MVS1	A	N 8	0	7	N N N	0.0	2.0	CP	00.00.54.349	00.00.54.950	4.53	4.58	0.01	0.82	0.
TST1	A	N 30	0	5	N N N	0.0	2.0	CP	00.00.38.199	00.00.38.772	3.18	3.23	0.01	0.58	0.
DEV1	A	N 170	0	77	N N N	0.0	5.0	CP	00.09.42.633	00.09.44.905	19.42	19.50	0.03	8.83	8.
MVSA	A	N 11	0	6	N N N	0.0	2.0	CP	00.00.45.334	00.00.45.917	3.78	3.83	0.01	0.69	0.
SYS1	A	N 25	0	16	N N N	0.0	1.0	CP	00.01.58.172	00.01.58.868	19.70	19.81	0.01	1.79	1.
SYS4	A	N 9	0	6	N N N	0.0	1.0	CP	00.00.45.955	00.00.46.476	7.66	7.75	0.01	0.70	0.
MVSB	A	N 12	0	3	N N N	0.0	1.0	CP	00.00.25.997	00.00.26.451	4.33	4.41	0.01	0.39	0.
SYSE	A	N 8	0	3	N N N	0.0	1.0	CP	00.00.26.166	00.00.26.656	4.36	4.44	0.01	0.40	0.
SYSC	A	N 8	0	3	N N N	0.0	1.0	CP	00.00.21.323	00.00.21.795	3.55	3.63	0.01	0.32	0.
MVSC	A	N 158	180	82	N N N	0.0	4.0	CP	00.10.16.222	00.10.18.785	25.68	25.78	0.04	9.34	9.
TST4	A	N 11	80	8	N N N	0.0	2.0	CP	00.00.56.901	00.00.57.559	4.74	4.80	0.01	0.86	0.
PHYSICAL										00.00.23.747			0.36		0.
TOTAL		1000							00.53.30.632	00.54.14.451			0.66	48.65	49.

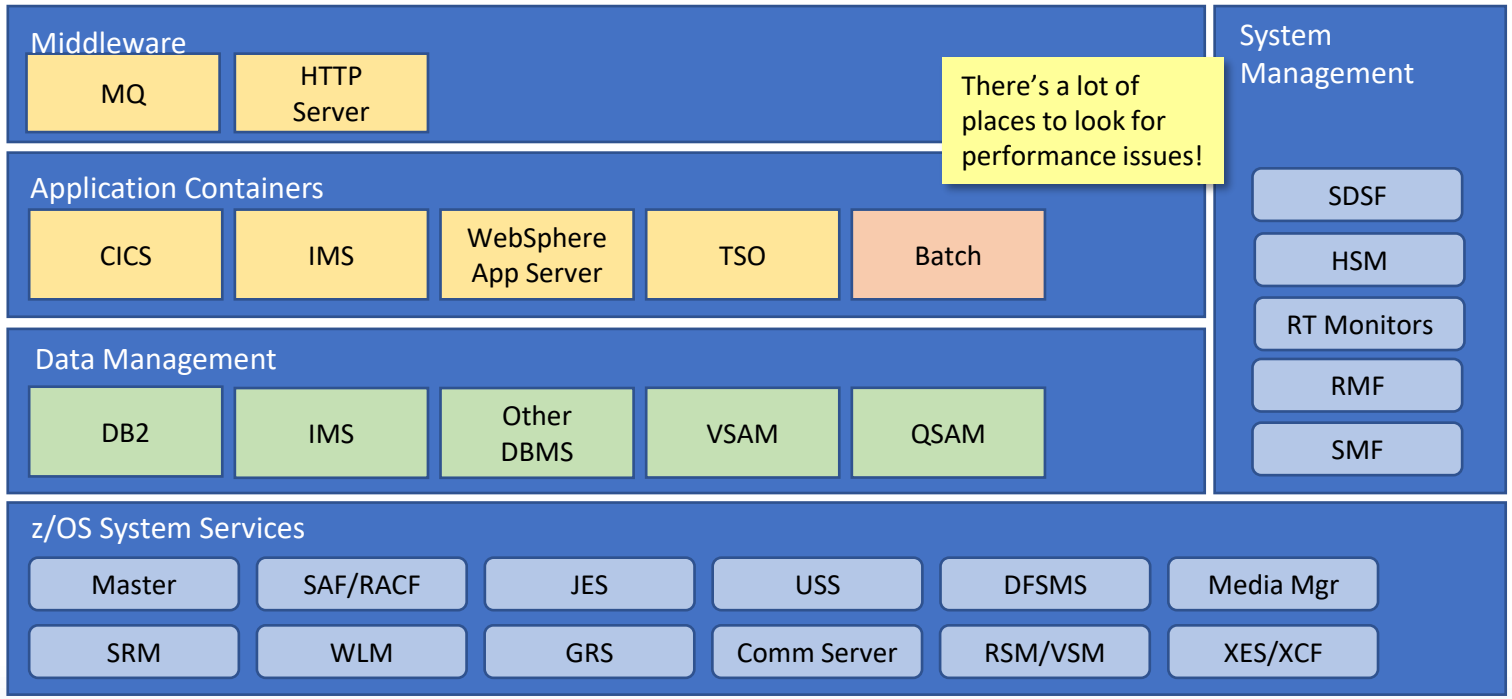
Useful reports to help you start discovering your configuration can be generated from the following SMF records:

- SMF 70 – Processor
- SMF 71 – Memory
- SMF 72 – WLM Config
- SMF 73 – Channel Paths
- SMF 74 –
  - I/O subsystem
  - Cache subsystem
  - XCF
  - Coupling Facility
- SMF 75 – Page Dataset

Many others to better understand your workloads

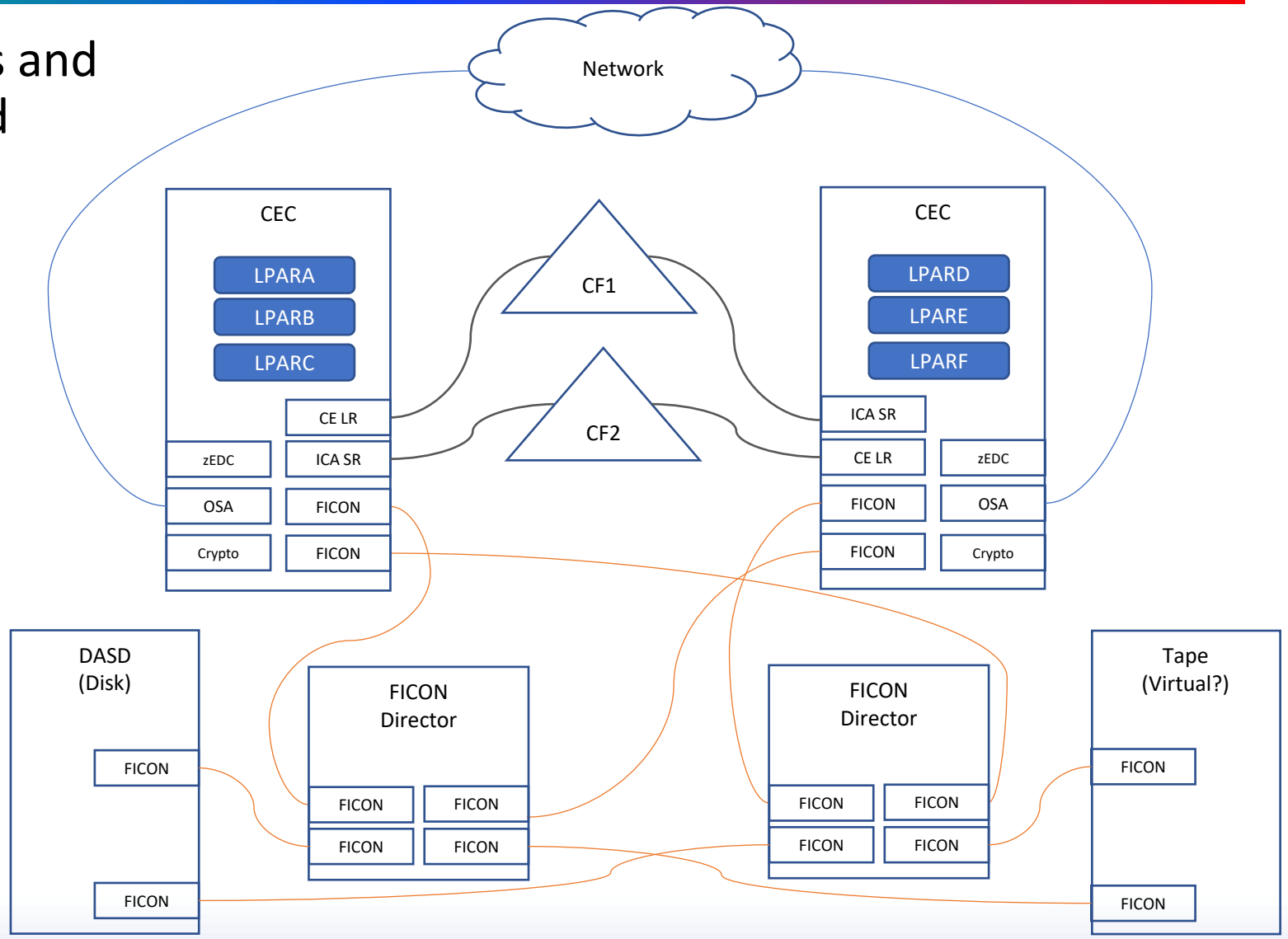
Inventory your software stack

- Installed software and products huge implications to performance and capacity
  - System software stack
  - Application and transaction management products
  - Database management products
  - Systems management products
  - Monitors
- Software products, levels, and choices impact performance, and factors into tuning and capacity decisions
  - Product levels
  - Product dependencies
  - How the products interact



Understand the physical system and Sysplex configurations

- Learn how the physical resources and software stacks are all configured and put together to create your working environment
  - Understand how the hardware is connected
  - Understand how the software in associated with hardware
  - Understand system, Sysplex and data sharing configurations



Understand the system and Sysplex configurations

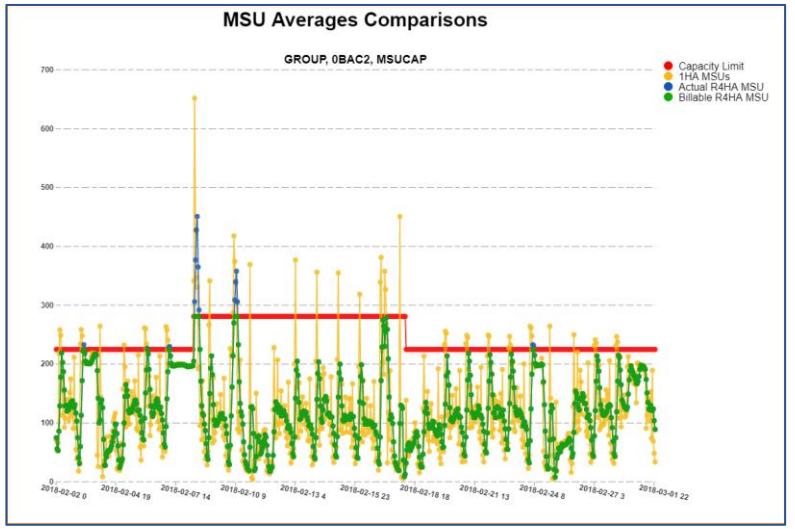
- Also make sure you ask why the configuration exists as it does
  - Every system has configuration details, a purpose, a priority, etc.
  - Every Sysplex and Monoplex have configuration details, a purpose and priority
  - Why are things setup the way they are?

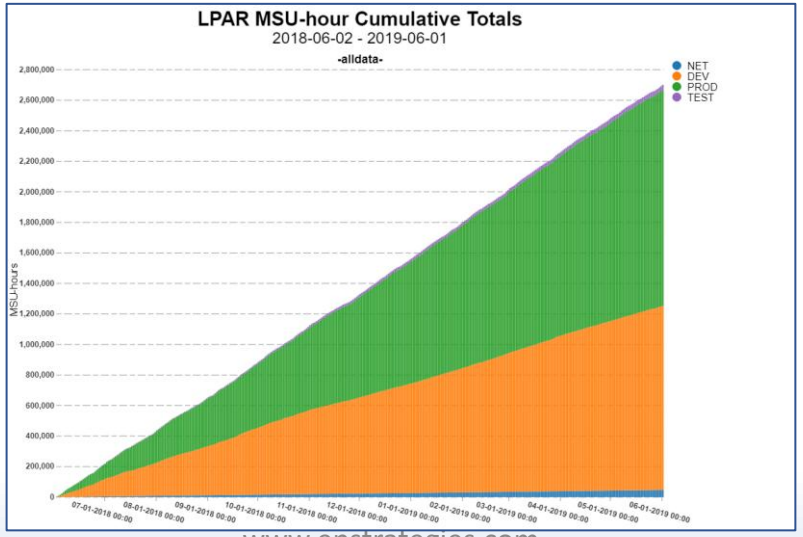
- Of course, there are disaster recovery configurations and details
  - What is the DR configuration
  - How does the DR work?
  - What type mirroring is involved
  - Etc.

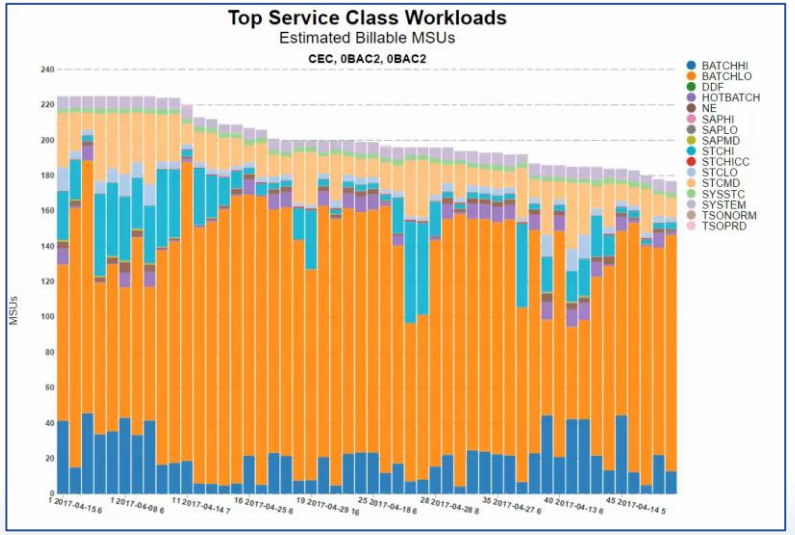
- Note: Most installations maintain configuration summary spreadsheets and mappings
  - Tap into these spreadsheets, presentations, and documents
  - But if your installations lacks such formal documentation, then documenting is an amazing learning experience
  - Maybe even use this exercise as an opportunity to update these configuration summaries to make sure they current

Understand pricing and software billing

- What are you pricing agreements?
  - R4HA?, TFP?, etc.
  - Separate development env agreements?
  - Do you have software products that control or influence this?
- Unfortunately, software pricing controls are a nutty pairing with performance
- What are the imposed pricing constraints?
- If TFP, what is your baseline and anniversary date.







Inventory and understand your customers and workloads

- The workloads are what give the resources and software purpose, so it is important to know your customers and what their performance sensitivity points are
  - Who are your customers?
  - What are service level objectives and performance expectations
  - What workload and transactions are servicing each customer group
  - Learn the performance sensitivities of their workloads from start to finish
  - Learn to prioritize which analysis and tasks to do first (Hint: Processor usually the best place to start)

- Your workloads have many pieces
  - Transaction and communication manager workloads
    - CICS, IMS, WAS, SAP, etc…
  - Database management workload
    - DB2, VSAM, IMS/DB, IDMS, Adabase, etc
  - Batch
    - Daytime, adhoc, nighttime, development
  - Interactive workloads
    - TSO, USS
  - Distributed and e-commerce workloads
    - DDF, HTTP, etc.
  - System and system programmer maintenance workloads

Understand who your customers are

- Identify your customer groups
  - Customers that are end-users outside your company
  - Your system programmer colleagues
  - Your management
  - The helpdesk
  - The financial groups
  - Whomever is using your computing environment

- Identify when these customers and their workloads are most senstive
  - Production workloads
  - Development, Test, Sandbox workloads
  - System programmer
  - 24-hour workloads
  - Month-end, quarter-end, year-end workloads
  - Seasonal workloads
  - Disaster recovery
  - Etc…

Understand who your customers are

- Discovery the workloads from a ‘physical’ point-of view via monitors and SMF
  - Address spaces or enclaves or flowing transactions?
  - Are the address spaces servers or workers or system or… ?
  - Are the transactions managed by WLM?
  - What are the objectives and importance of the workloads?

- Remember that not all workloads are alike
  - Interactive workloads versus background workloads
  - System workloads versus customer workloads
  - High importance workloads versus low importance workloads
  - High regular volume workloads versus low sporadic volume workloads
  - Short running work versus long running work
  - Distributed workloads versus single system workloads
  - Commerce workloads versus legacy workloads
  - And much more

Building your knowledge base

Performance management and capacity planning requires a series of skills

- Start to build your skills base by studying the fundamentals

Building your knowledge base

- Foundational Concepts:
  - Learn Mainframe architecture, z/OS components, how things work
- Terminology Glossary:
  - Learn the most common z/OS performance terms
- Tools and Data Sources:
  - How to access, read, and interpret RMF, SMF, WLM Def, and third-party monitors
- Learn how the workloads get started and run:
  - Step-by-step procedures for common performance tasks
- Gather reliable sources of information:
  - Links to IBM documentation, Redbooks, and trusted external resources

Foundational Concepts

- z/OS performance and capacity planning are disciplines about finding the ultimate balance of resources and workloads

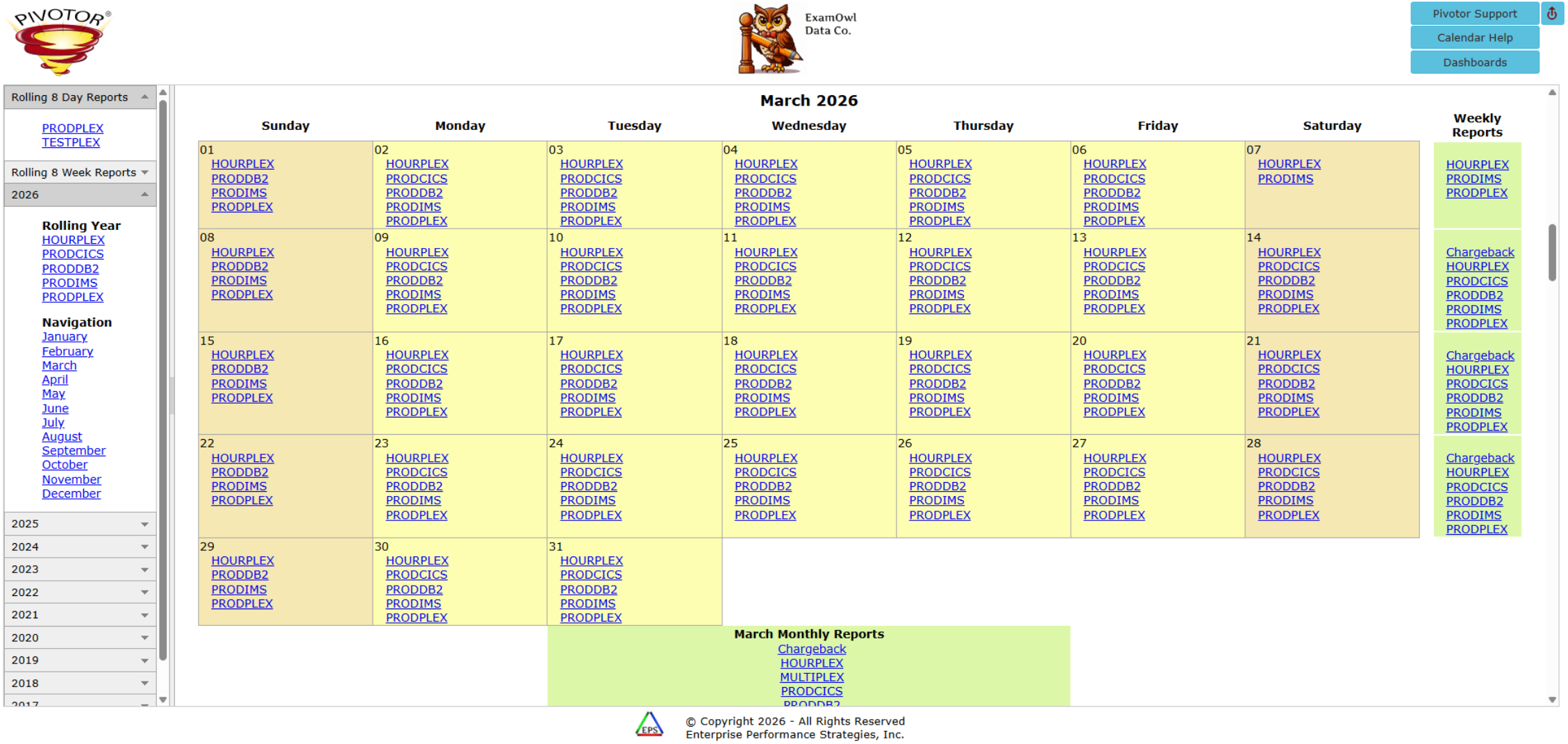
- Resource: Learn the fundamental concepts of the main system resources, and how they are allocated, work, and how changes make a difference
  - Processor, Memory, I/O subsystem, Coupling Facility, peripherals, etc.

- Workloads: Learn the fundamental concepts of workload performance, and this include some of the basic formulas used during an evaluation
  - Examples include:
    - Response Time vs. Throughput: User experience vs. system capacity
    - Service Time & Queue Time: Understanding where time is consumed in the system
    - Utilization & Saturation: The danger zone when resources approach 100% busy
    - Think Time & Arrival Rates: How workload patterns drive demand
    - Etc…

Tools and Data Sources:
- Learn about monitors and measurements

- Understanding z/OS measurements is a foundational cornerstone of any performance and capacity planning responsibility
  - Key data sources via multiple monitors and system facilities
    - RMF / CMF measurements
    - Standard z/OS SMF records
    - Transactional measurements
  - Learn not just the measurement sources, but fundamentals of the metrics and how to curate them into useful measurement to answer your questions
    - Counts, Averages, Percentages, Utilizations, Rates, Intensities, Ratios, etc.
- Understand what reporting tools you have available to you
  - Realtime monitors
  - Post processor reporting
  - Tools (such as zPCR, etc)

Naturally, consider our reporting service - Pivotor



Find reliable sources of information

- There are many sources of information online, and the AI engines are getting better at pointing to reliable sources and helping to answer question

- Know your sources of documentation
  - Online IBM documentation
  - Redbooks (especially 'The ABCs of System Programming' series)
  - Many presentations at www.epstrategies.com
  - YouTube videos
  - Past conference proceedings

Take advantage of available education

- Know your educational opportunities
  - EPS classes cover the key areas of z/OS performance (visit www.epstrategies.com)
    - Essential performance skills
    - WLM
    - Sysplex and Data sharing
  - Conferences
    - SHARE – Great for technical updates, base education, and presentations that dive into details
    - IBM TechXchange – tends to be a lot of IBM marketing and heavy concentration on AI
    - Other vendor conferences
  - Online education
  - Documentation
    - Lots of documentation online, and search engines tend to do very well
    - Recommend to look up the IBM Redbooks: 'ABCs of System Programming'

Growing your skills over time by starting with simple analysis and system improvements

Get started by doing small exercises

- Some simple ‘discovery’ exercises to get you started:
  - Learn how to process SMF data and run reports at your shop
  - Learn how to invoke and read your online monitors
  - Learn how to obtain reports based on SMF, and other data sources
    - And remember… consider Pivotor to help here
  - Learn how to obtain a copy of your WLM service definition
    - And then learn to read the WLM service definition
      (Note: Visit www.epstrategies.com for a great WLM to HTML formatting tool)
    - Match the WLM service definition up to the corresponding measurements
  - Get a copy of the following members of parmlib, and understand their settings:
    - IEAOPTxx
    - SMFPRMxx
    - COUPLxx

Quick wins to help structure your start

- Here are some quick useful exercises you should do to get you started:
  - Create a one-page z/OS performance "cheat sheet" covering the top 10 metrics
  - Document an understanding of the H/W, S/W environment, and customer workloads
  - Create a guided walkthrough of your shop's performance reporting environment
  - Some easy "first performance gathering investigations"
    - What are the utilizations of the CECs, the LPARs, and the workloads?
    - Who are my top workloads consuming CPU, and what workload drives the usage?
    - What is the usage of memory, and which workloads are using that memory?
    - What are my I/O rates and response times?
    - What are the goals for my workloads, and are my workloads achieving those goals?

Growing Skills – Be hands on

- Learning performance analysis and capacity planning is a ‘hands-on’ activity that takes repetitive and time to master

- Here are some simple questions to ask and answer of your data:
  - What are the utilizations of the CECs, the LPARs, and the workloads?
  - What are my top workloads consuming CPU, and what workload drives the usage?
  - What is the usage of memory, and which workloads are using that memory?
  - What are my I/O rates and response times?
  - What are the goals for my workloads, and are my workloads achieving those goals?
  - Many more other simple questions

What skills should you focus on?

- Portable ones!
  - I.E. ones you can apply in the future in other contexts
- Fundamentals of Performance Management and Capacity Planning are broadly applicable
  - Of course there are important differences across platforms, but the thought processes you learn on the mainframe can be applied elsewhere
- Excel (pivot tables!) and basic data analysis

- AI
  - You might not lose your job to AI, but you might to somebody who can use AI well
- What I wouldn't worry so much about: things that are very specific
  - Decoding SMF records
  - Declining programming languages

Final Recommendation when getting started

- Make friends, meet mentors, be a mentor
  - Chances are there are others that already know what you want to learn
- Get to know who to talk with
  - Chances are they already have an idea where you need to concentrate your efforts
  - Examples:
    - If you are not the Db2 person, you should find the Db2 person
    - Who are the application developers?
    - Who is your sales rep?
    - Etc…
- Good colleagues will know a bunch!
  - Great colleagues will openly and readily share the information!
- And if there is no one?
  - Then become that person!
- Also think about becoming a mentor for the new folks

Key Recommendations

- Here are some key recommendations we strongly suggest
  - Find a mentor
  - Never stop learning
  - Diversify
  - Learn how to formulate analysis questions and objectives
  - Learn how to interrogate and study data

- Most of all, be patient
  - It is easy to listen to, and then implement, a recommendation
  - It takes a lot more time to become a performance and capacity planning expert
  - Be patient and grow!

Thanks!
Questions?

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