Capacity Tools updates for z17 (zBNA & zPCR)

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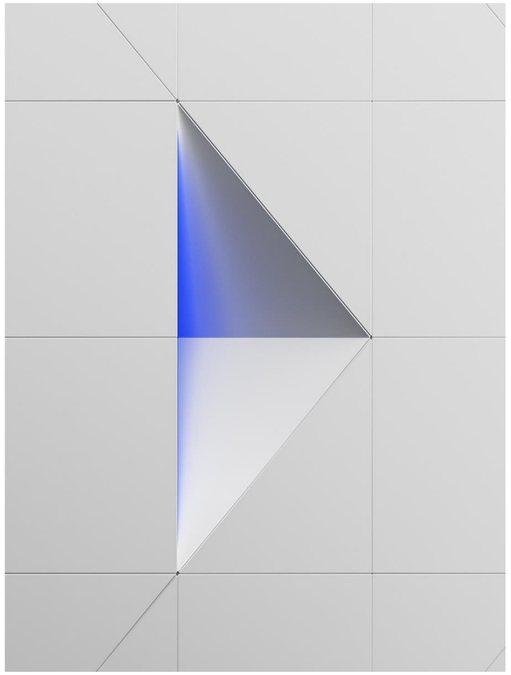
Contents



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Using zPCR for z17 Upgrades

Goal: Empowering you with the tools to start z17 sizing conversations

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Capacity Concepts

LSPR = Large Systems Performance Ratio
IBM builds LSPR data from a set of benchmarks running representative workloads

The unit of capacity is relative "MIPS" (Million Instructions Per Second) and is consistent across all generations of processors

Multi-Image (MI) Processor Capacity Ratio table
Median complex LPAR configuration for each IBM Z model based on customer profiles (most representative for vast majority of customers)

Used for "high-level" starting-point sizing ONLY

LSPR Workload Categories
Based on various combinations of measured workloads including CICS, Db2, IMS, OSAM, VSAM, Websphere, and COBOL

Categorized into Low/Average/High based on use of the memory hierarchy
CPUMF data matches workload to an LSPR curve

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IBM zPCR

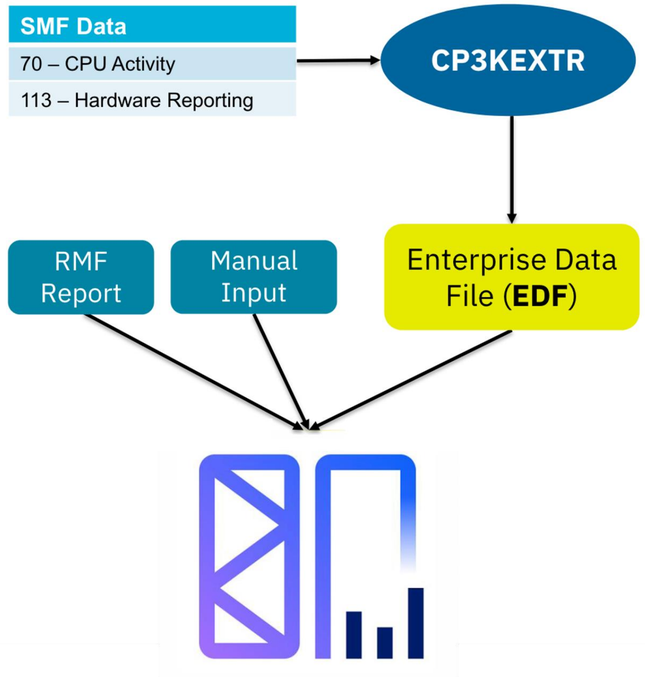
IBM zPCR (IBM z Processor Capacity Reference)

Publicly available tool that provides user with detailed capacity planning insight based on:

- Specific LPAR configuration,
- Specific workload category, and
- Specific use of specialty CPs (IFLs, zIIPs, ICFs)

Much more powerful and precise than the Multi-Image Processor Capacity Ration Tables (i.e. "MIPS" Tables), with expected accuracy of ±5%

SMF (System Management Facilities) collects records that can be used for sizing CPU to current workload. The IBM Data Extraction Program (IBM CP3KEXTR) extracts SMF data as recommended input for IBM zPCR.



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Planning for z17 with IBM zPCR

Determine starting point for CPU sizing

Identify LSPR curve your workload falls under and use built-in "MIPS table" to conveniently compare similar processors

Compare effective capacity

Examine changes from updates to processor configuration, such as:

- Processor model updates
- LPAR configuration changes
- Engine addition or consolidation

Model Spyre Card management requirements

View potential capacity impact of additional SSC Partitions:

3 Secure Service Container (SSC) LPARs, each with 2 shared IFLs with SMT

- 1 Appliance Control Center (ACC) partition
- 2 Spyre Support Appliance (SSA) partitions for each environment (e.g. Prod, Dev, Test)

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IBM zPCR Walkthrough

Goal: Use zPCR to demonstrate Capacity Net Change of two z17-705 machines.

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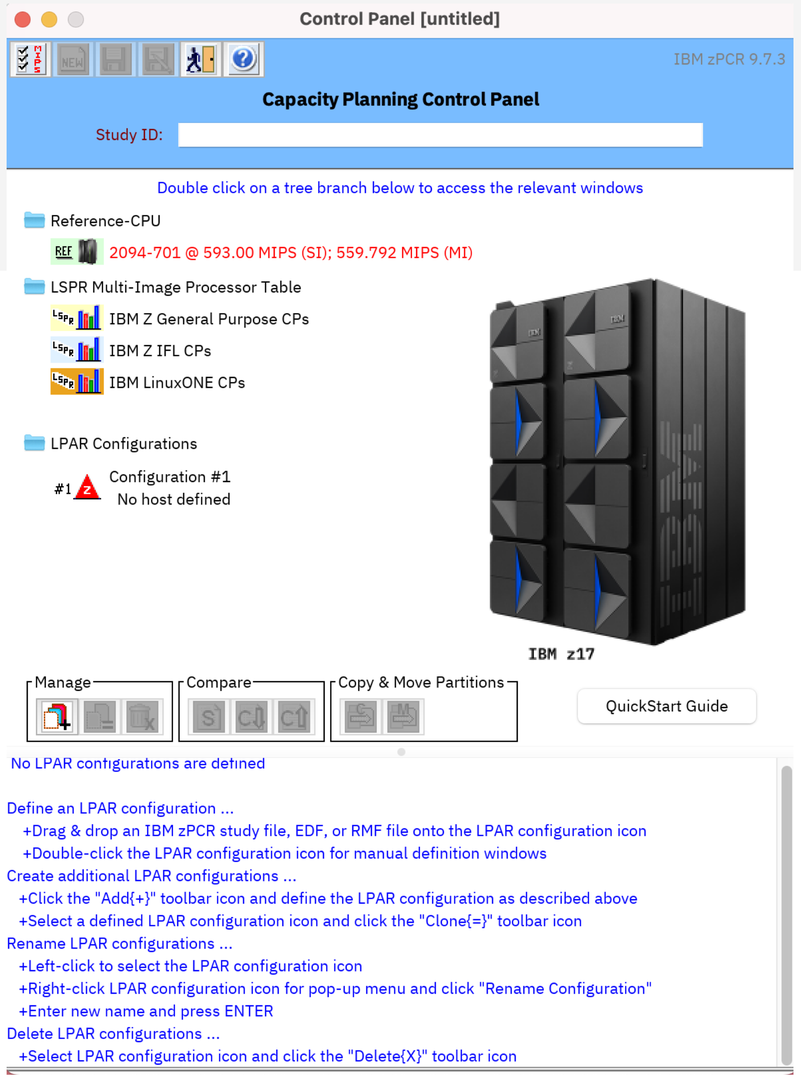
zPCR - Open Application

Splash screen of IBM zPCR v 9.7.3, released 5/6/25



What you see when you open the application

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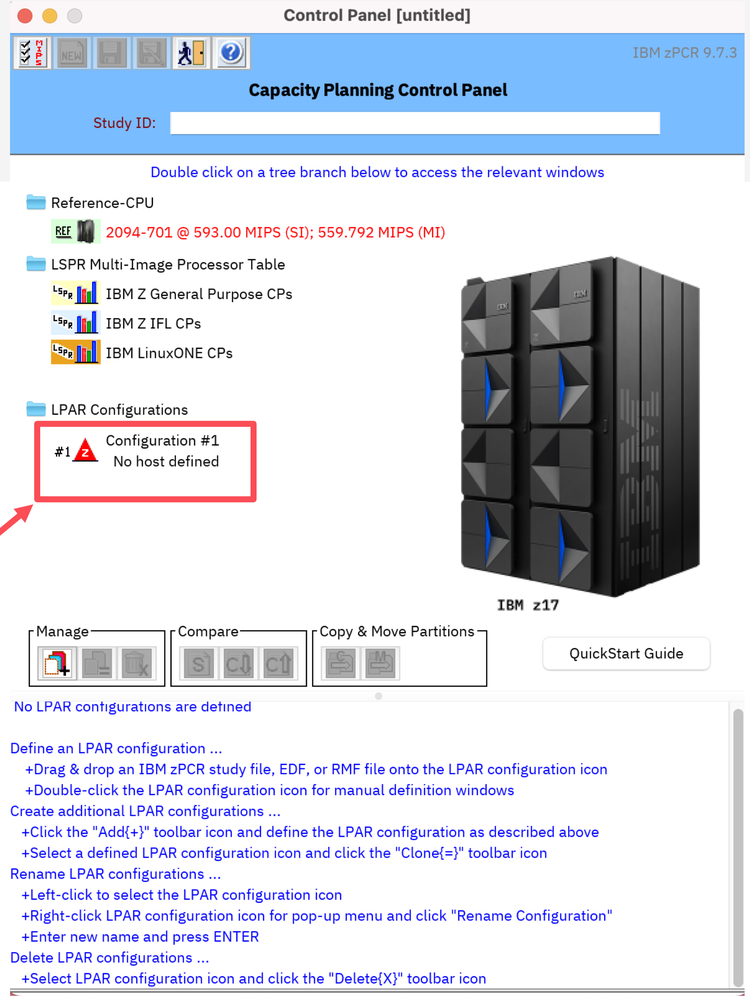
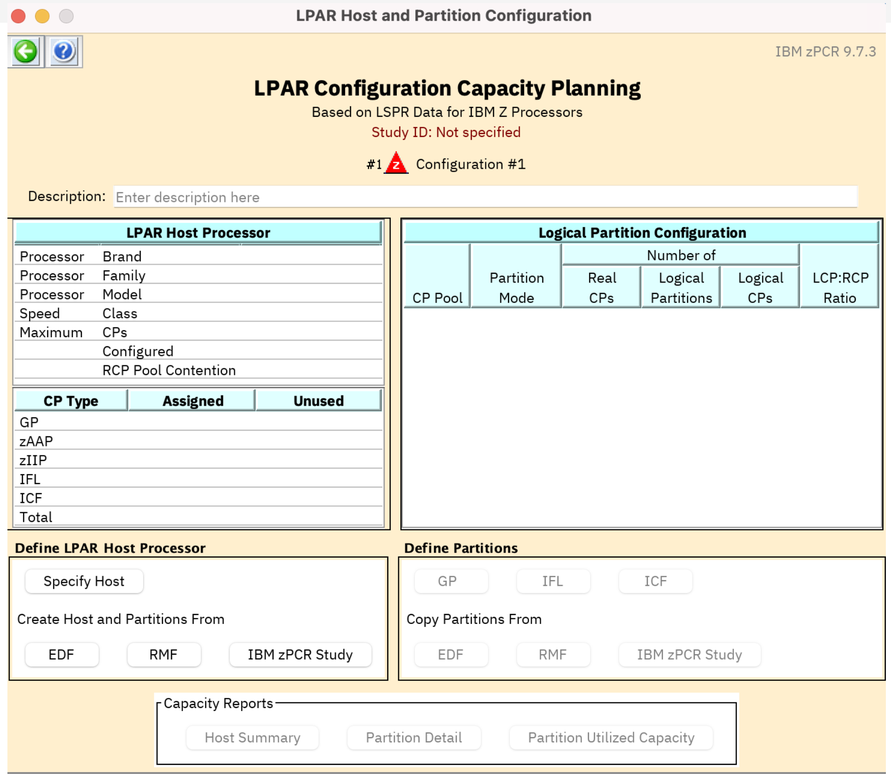
zPCR - Open Configuration #1



Double click on "Configuration #1"



The "LPAR Host and Partition Configuration" screen opens up

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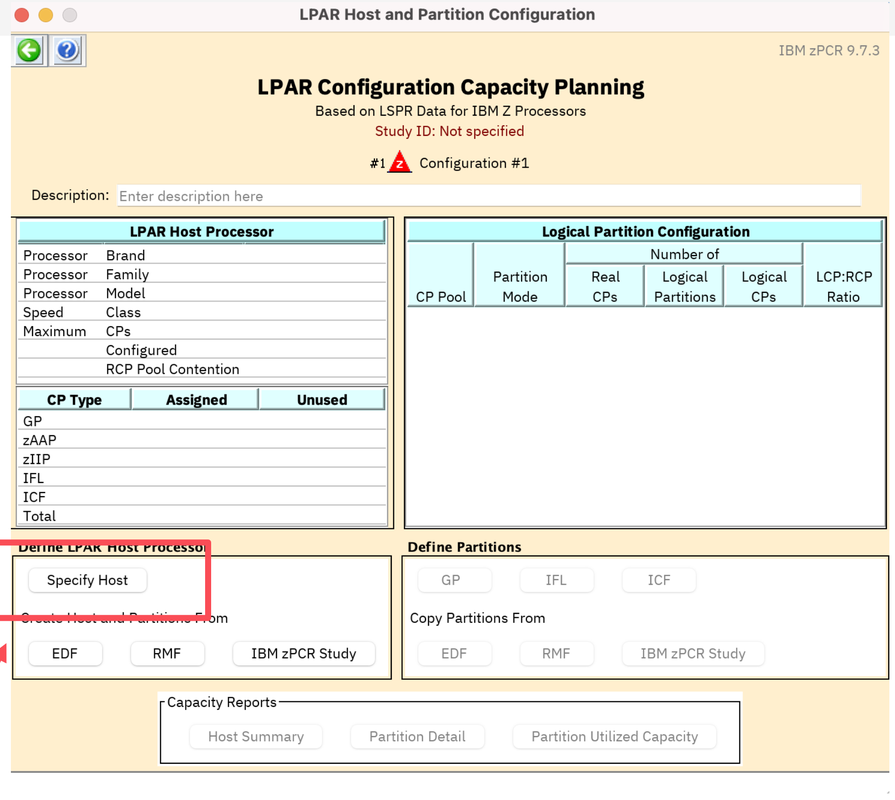
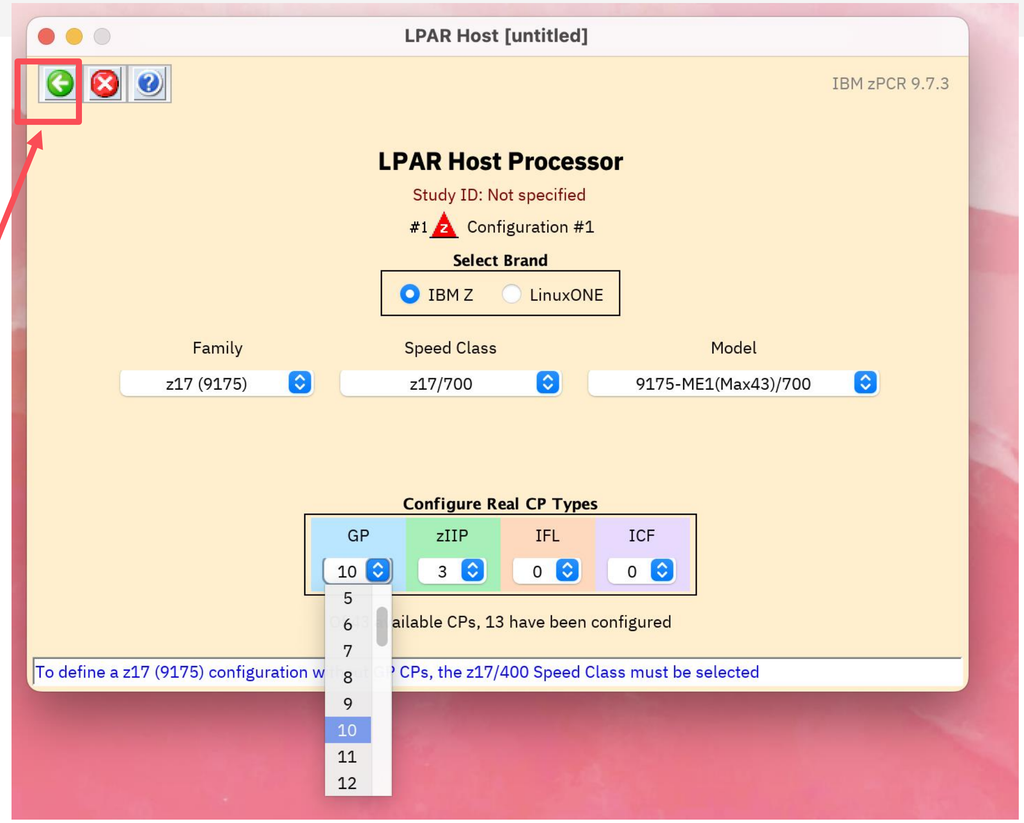
zPCR - Specify Host



Select "Specify Host"



Use the drop down menus to select the host processor. We'll select a z17-710 (Max43) with 3 zIIP engines. Then hit the "Return" arrow to save.

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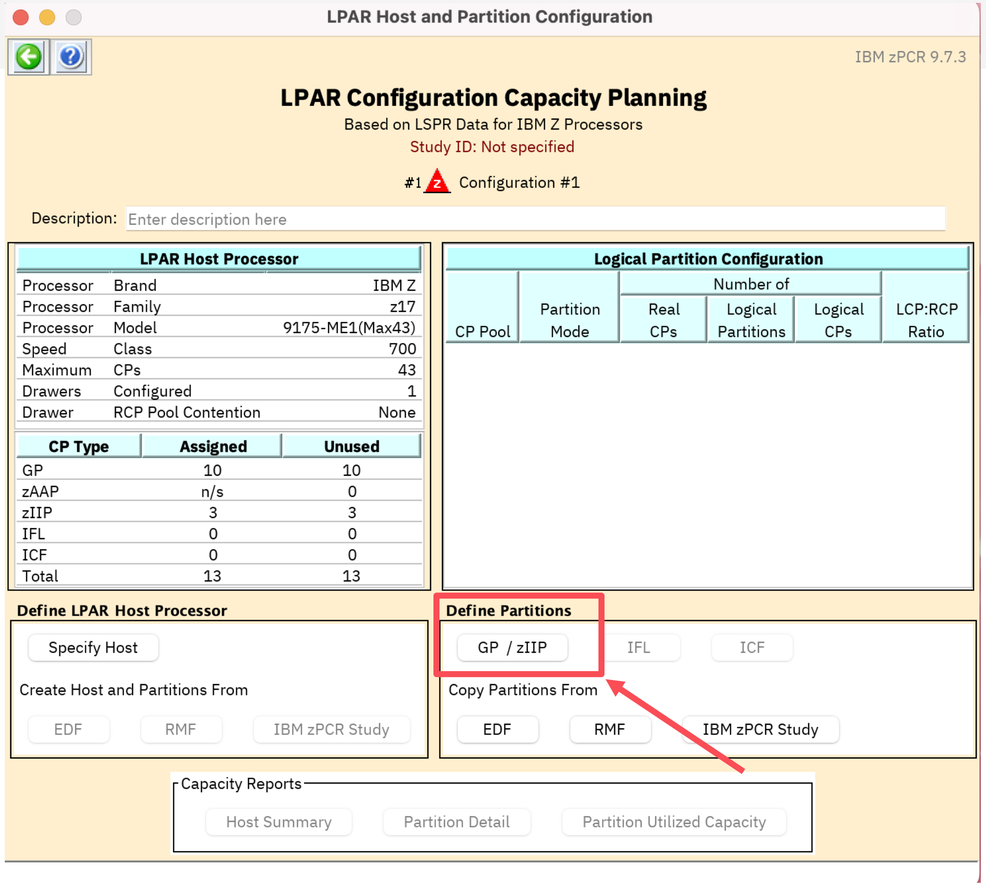
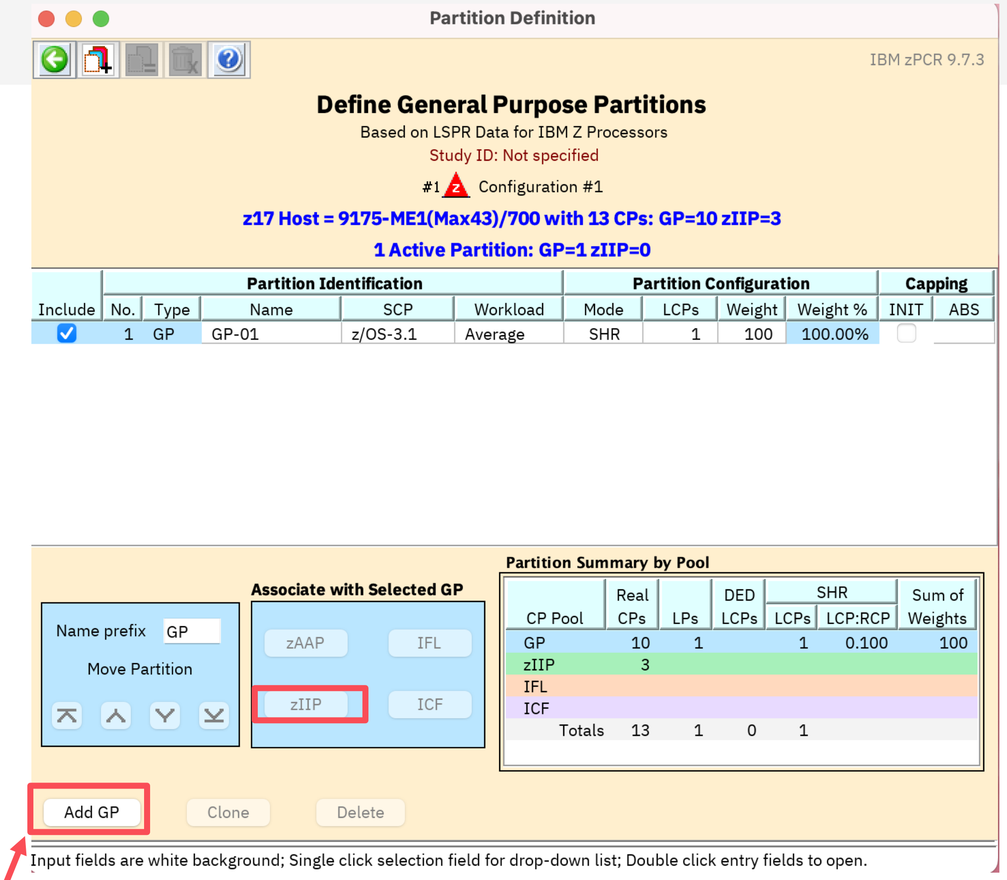
zPCR - Define Partitions



Under "Define Partitions" select "GP/zIIP"



Use "Add GP" to create 10 LPARs. Associate one zIIP LPAR with each.

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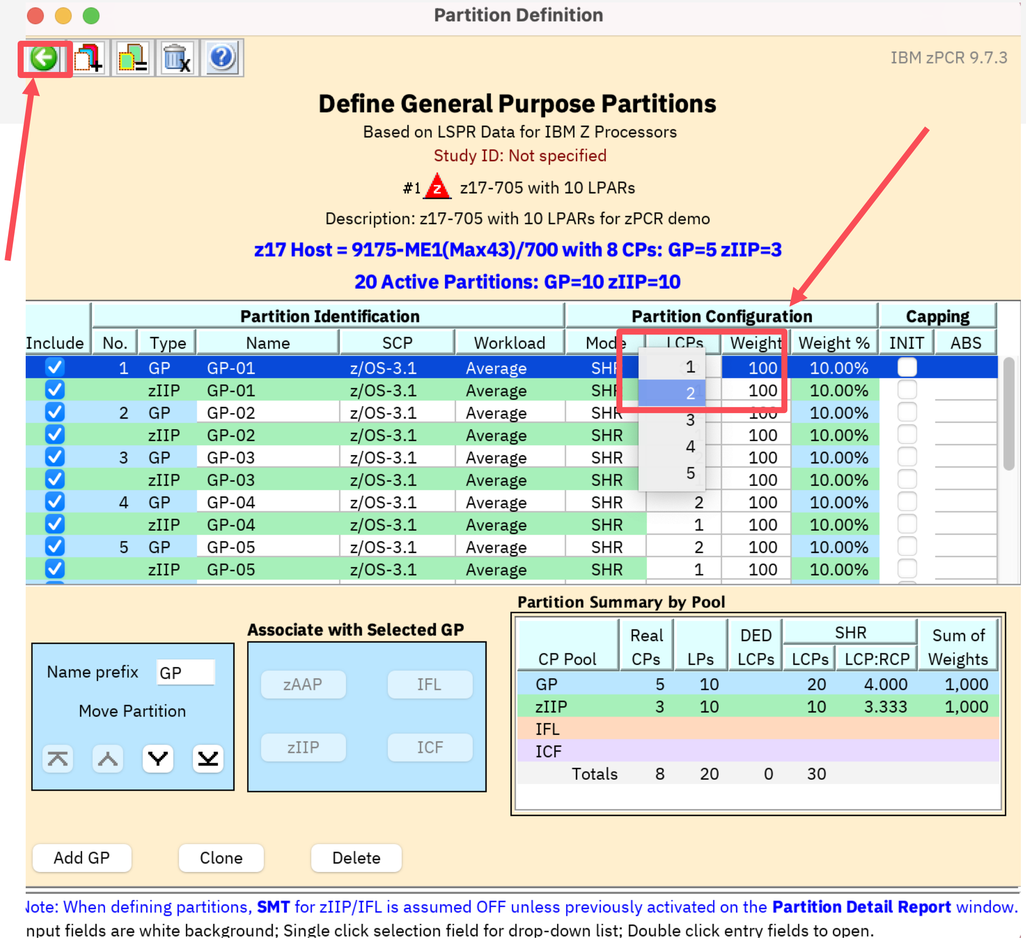
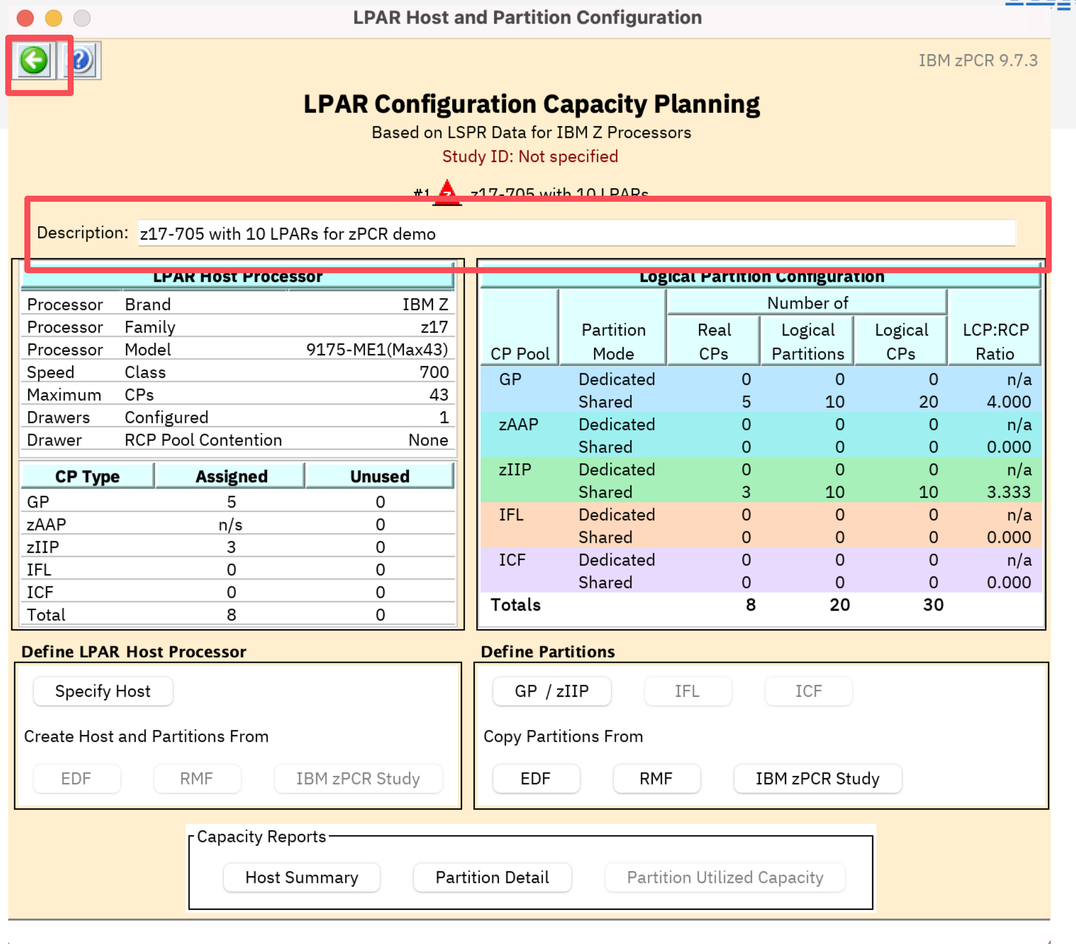
zPCR - Define Partitions



Use the drop-downs to define 2 LCPs to each GCP LPAR. Use the default weight of "100". Select the green "Return" arrow to save.



Add a description of the configuration, and use the "Return" arrow to save.

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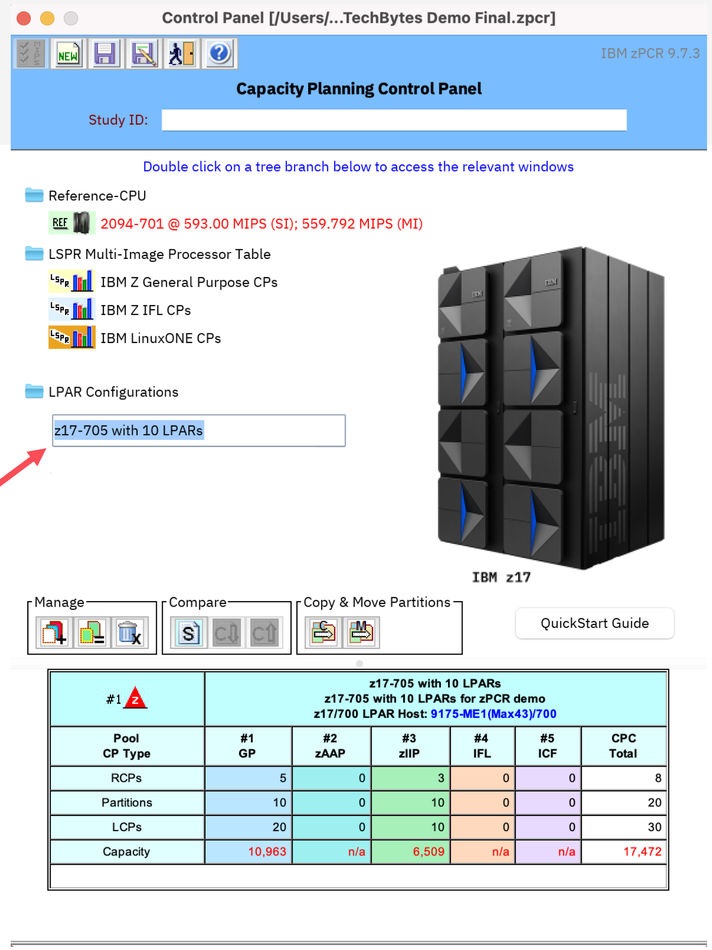
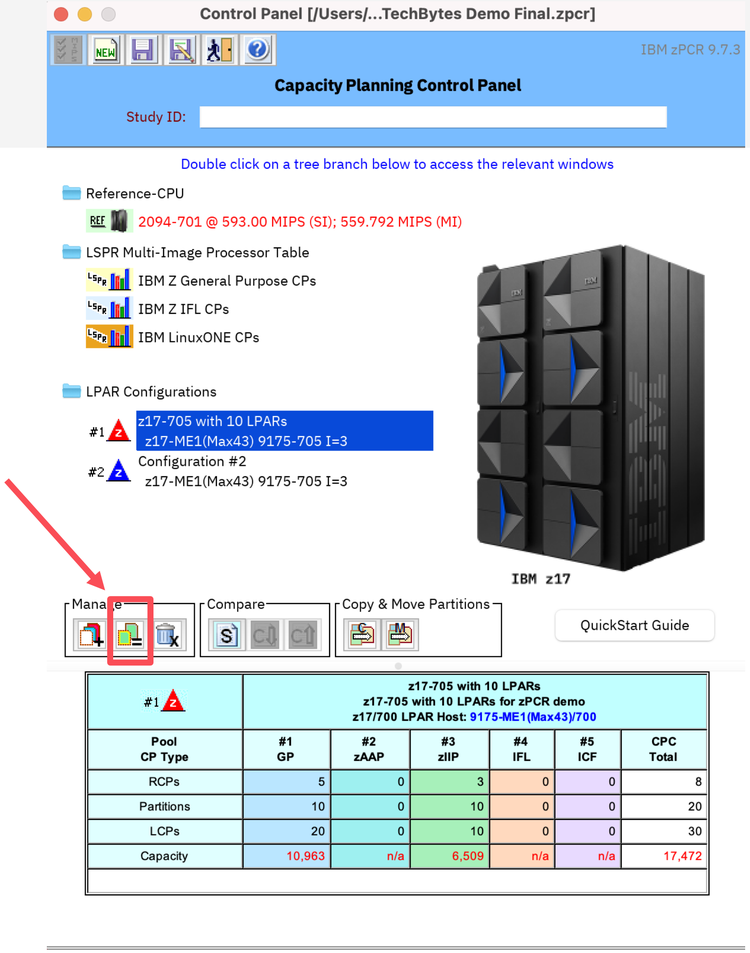
zPCR - Clone the configuration



Right click the configuration and select "Rename configuration". Assign this configuration a descriptive name.



Highlight Config #1, and use the "=" button to clone the configuration. Double click "Configuration #2"

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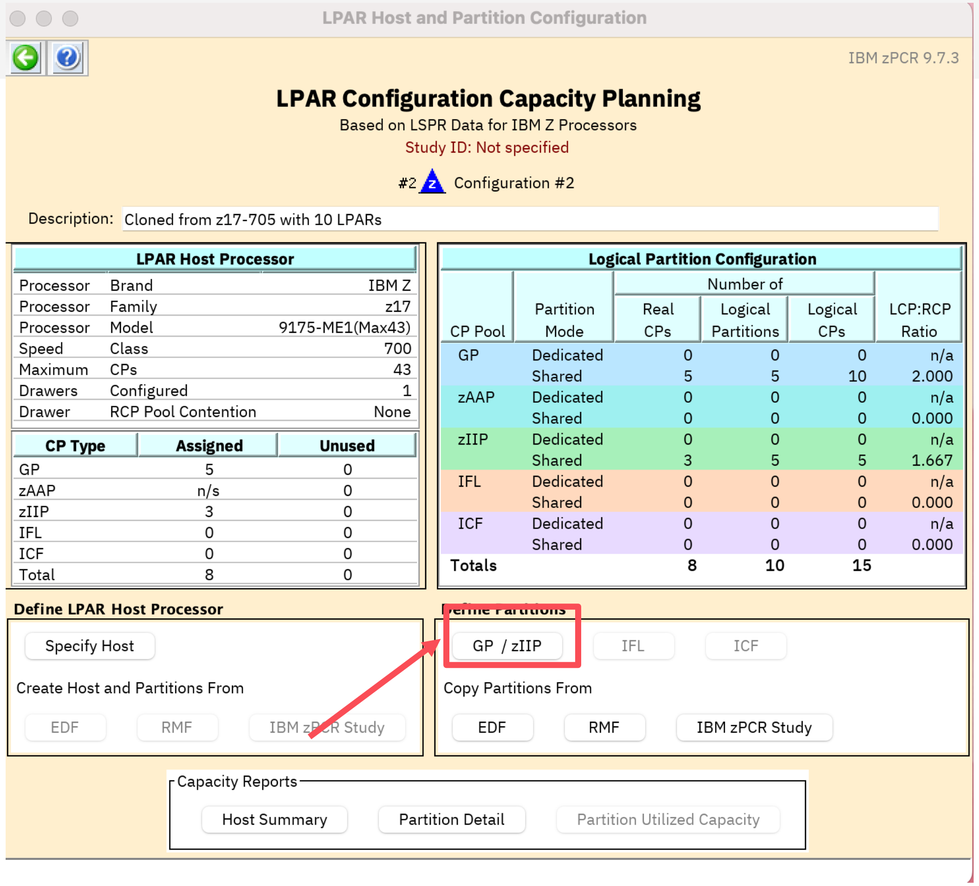
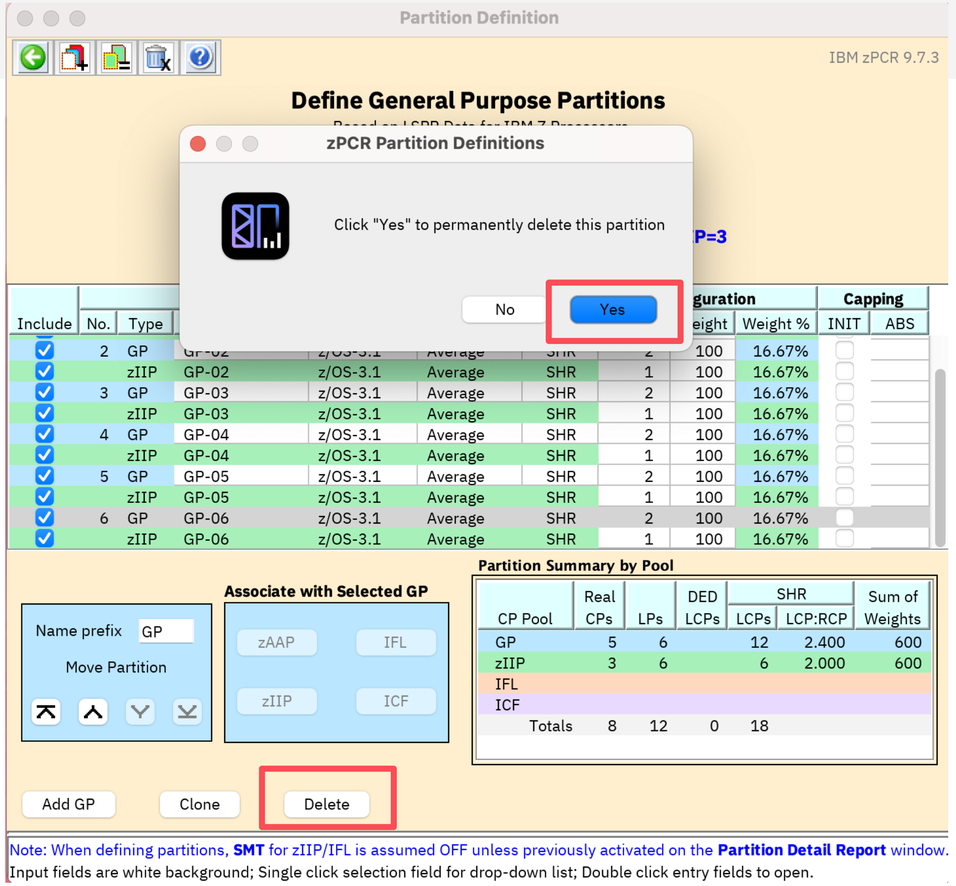
zPCR - Define Partitions



Under "Define Partitions" select "GP/zIIP"



For partitions GP-06 through GP-10, highlight, and select "Delete". Then hit "yes". When left with 5 Partitions, hit the green "Return" arrow.

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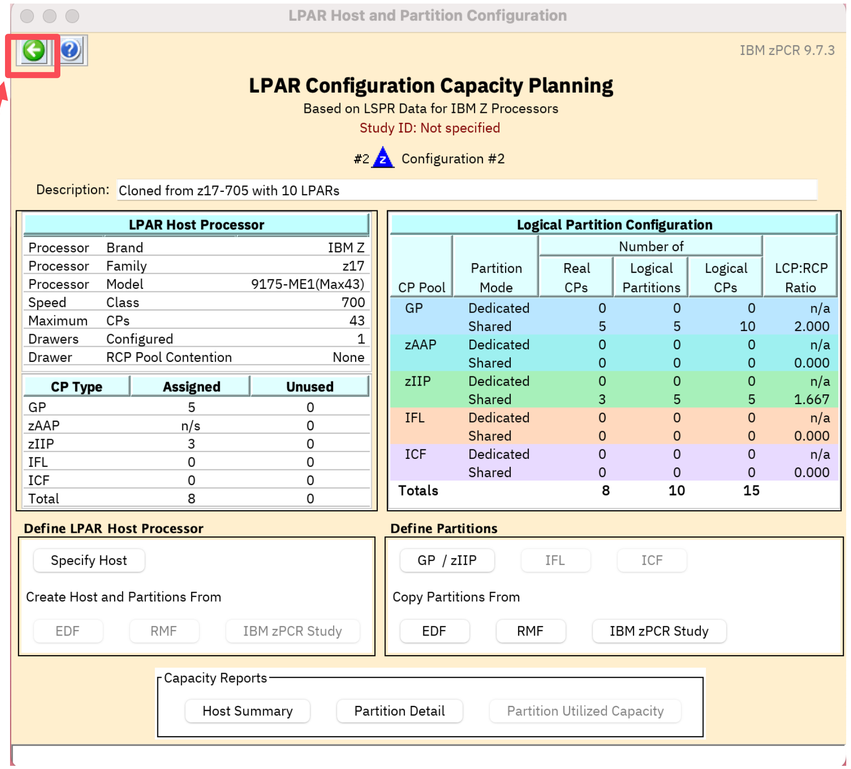
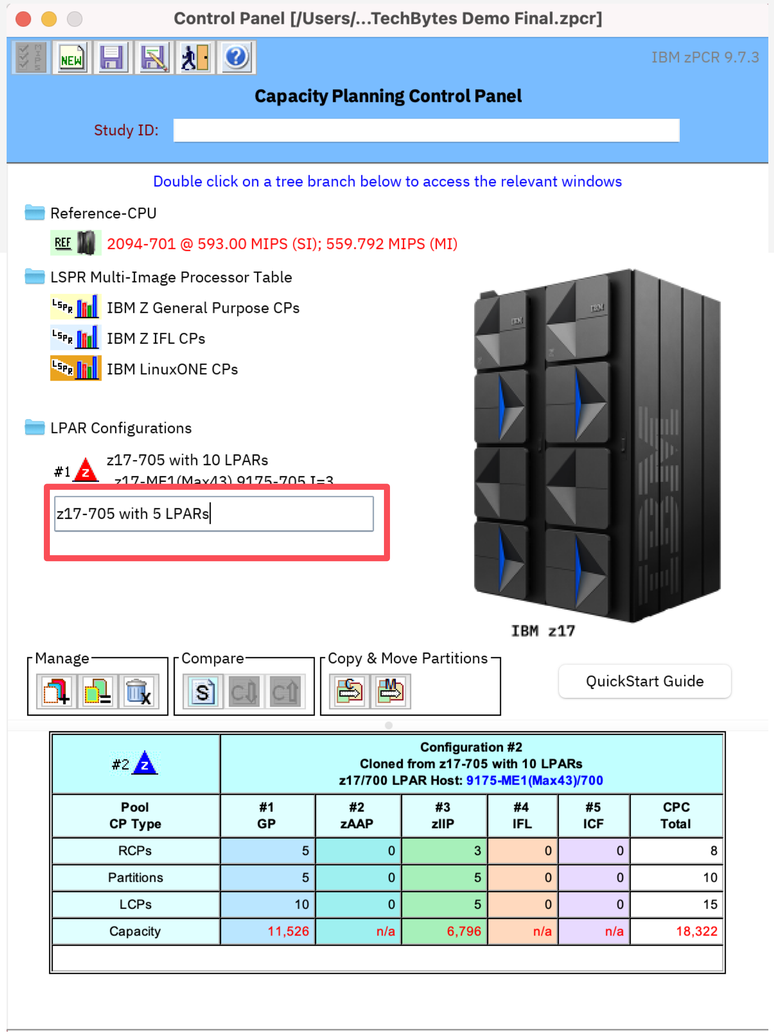
zPCR - Return & Rename



Hit the green "Return" arrow again.



Right click "Configuration #2" and select "Rename configuration". Give it a descriptive name.

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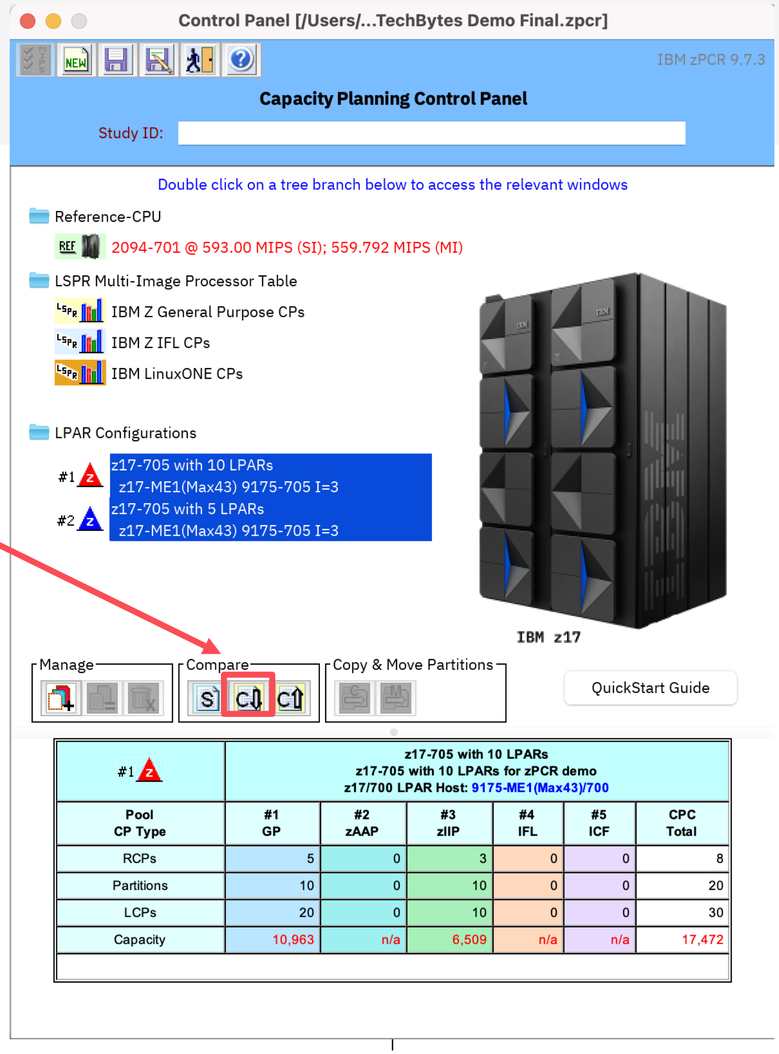
zPCR - Compare



Highlight both configurations and then select the middle "Compare" button.

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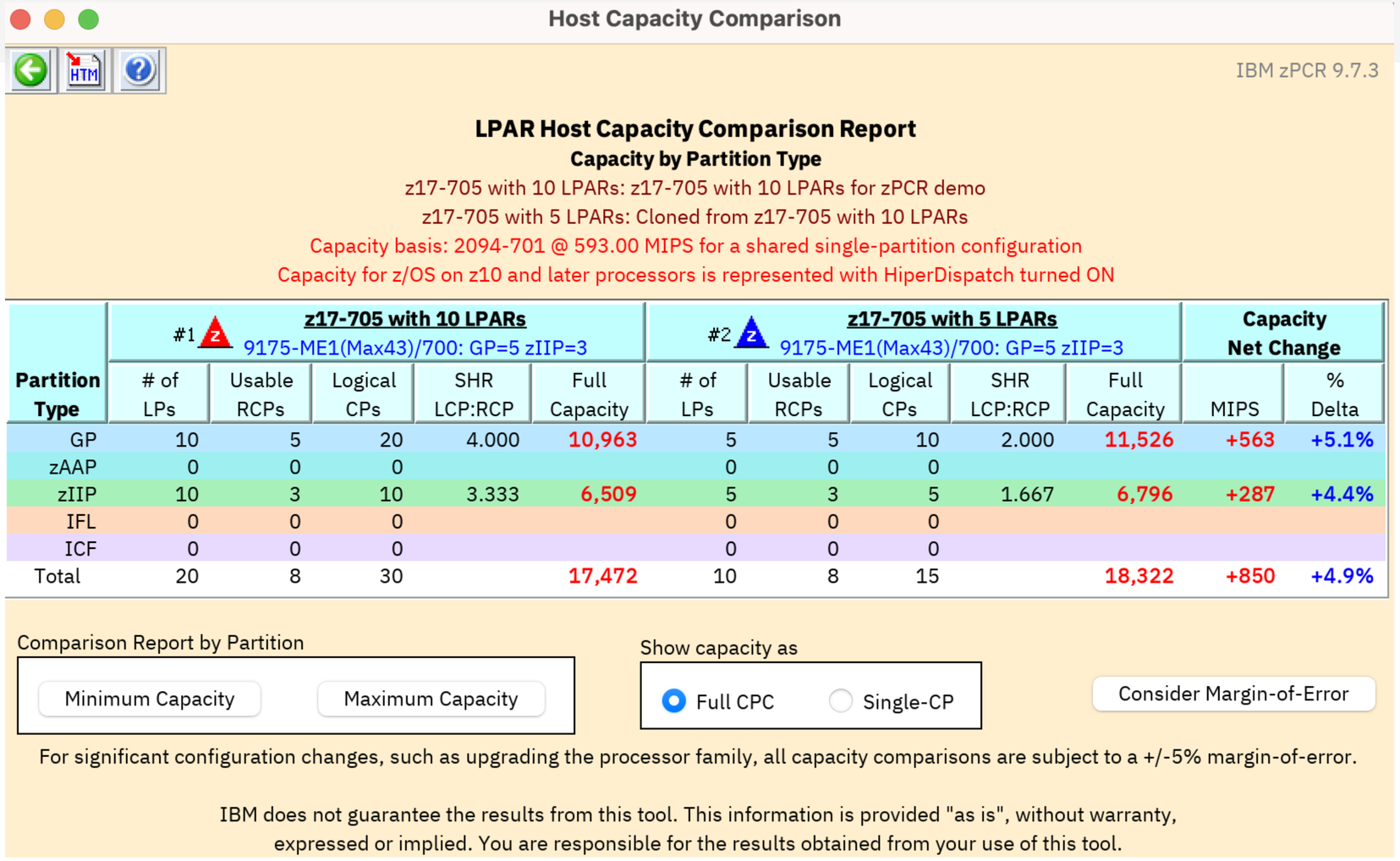
zPCR - Compare



Host Capacity Comparison

IBM zPCR 9.7.3

LPAR Host Capacity Comparison Report

Capacity by Partition Type

z17-705 with 10 LPARs: z17-705 with 10 LPARs for zPCR demo

z17-705 with 5 LPARs: Cloned from z17-705 with 10 LPARs

Capacity basis: 2094-701 @ 593.00 MIPS for a shared single-partition configuration

Capacity for z/OS on z10 and later processors is represented with HiperDispatch turned ON

Partition Type	#1 z17-705 with 10 LPARs 9175-ME1(Max43)/700: GP=5 zIIP=3					#2 z17-705 with 5 LPARs 9175-ME1(Max43)/700: GP=5 zIIP=3					Capacity Net Change	
	# of LPs	Usable RCPs	Logical CPs	SHR LCP:RCP	Full Capacity	# of LPs	Usable RCPs	Logical CPs	SHR LCP:RCP	Full Capacity	MIPS	% Delta
GP	10	5	20	4.000	10,963	5	5	10	2.000	11,526	+563	+5.1%
zAAP	0	0	0			0	0	0				
zIIP	10	3	10	3.333	6,509	5	3	5	1.667	6,796	+287	+4.4%
IFL	0	0	0			0	0	0				
ICF	0	0	0			0	0	0				
Total	20	8	30		17,472	10	8	15		18,322	+850	+4.9%

Comparison Report by Partition

Minimum Capacity | Maximum Capacity

Show capacity as

Full CPC | Single-CP

Consider Margin-of-Error

For significant configuration changes, such as upgrading the processor family, all capacity comparisons are subject to a +/-5% margin-of-error.

IBM does not guarantee the results from this tool. This information is provided "as is", without warranty, expressed or implied. You are responsible for the results obtained from your use of this tool.

Here we can see the "Capacity Net Change" in two z17-705 machines with different LPAR configurations.

Hit the "Return" green arrows and save the study.

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zBNA Updates

Goal: Learn about the new features in IBM zBNA (like DS8000 G10 zHyperLink™ analysis and new "Multiple LPAR Options" mode)

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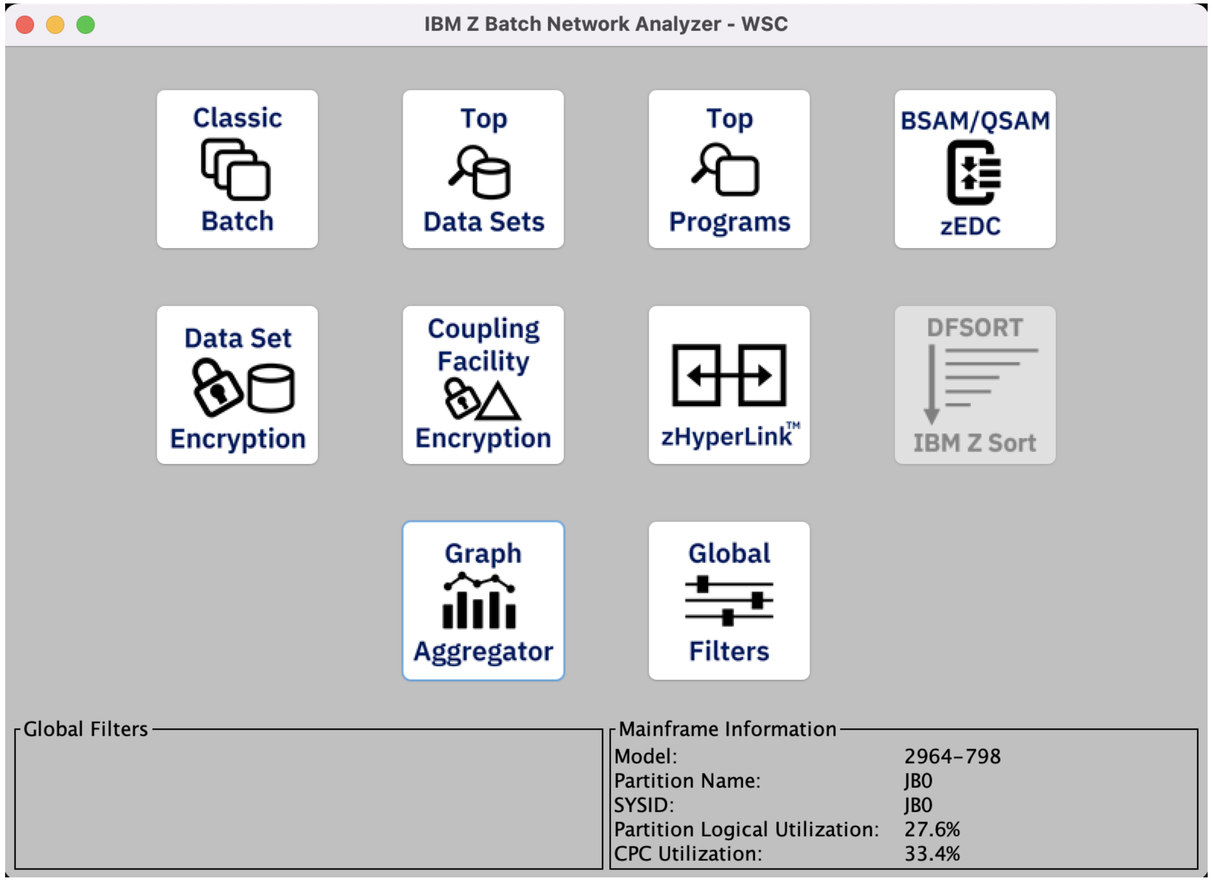
IBM Z Batch Network Analyzer (zBNA) Latest version: 2.7.1 (05/06/2025)

Designed to provide capacity planning insight for new IBM Z technology

- No charge, “as is” tool with easy to read graphical and text reports.
- Evaluate the impact of new technology exploitation, like zEDC and zHyperLink™, using system specific data.
- IBM zBNA identifies which applications are available based on the data provided in the DAT and EDF files.



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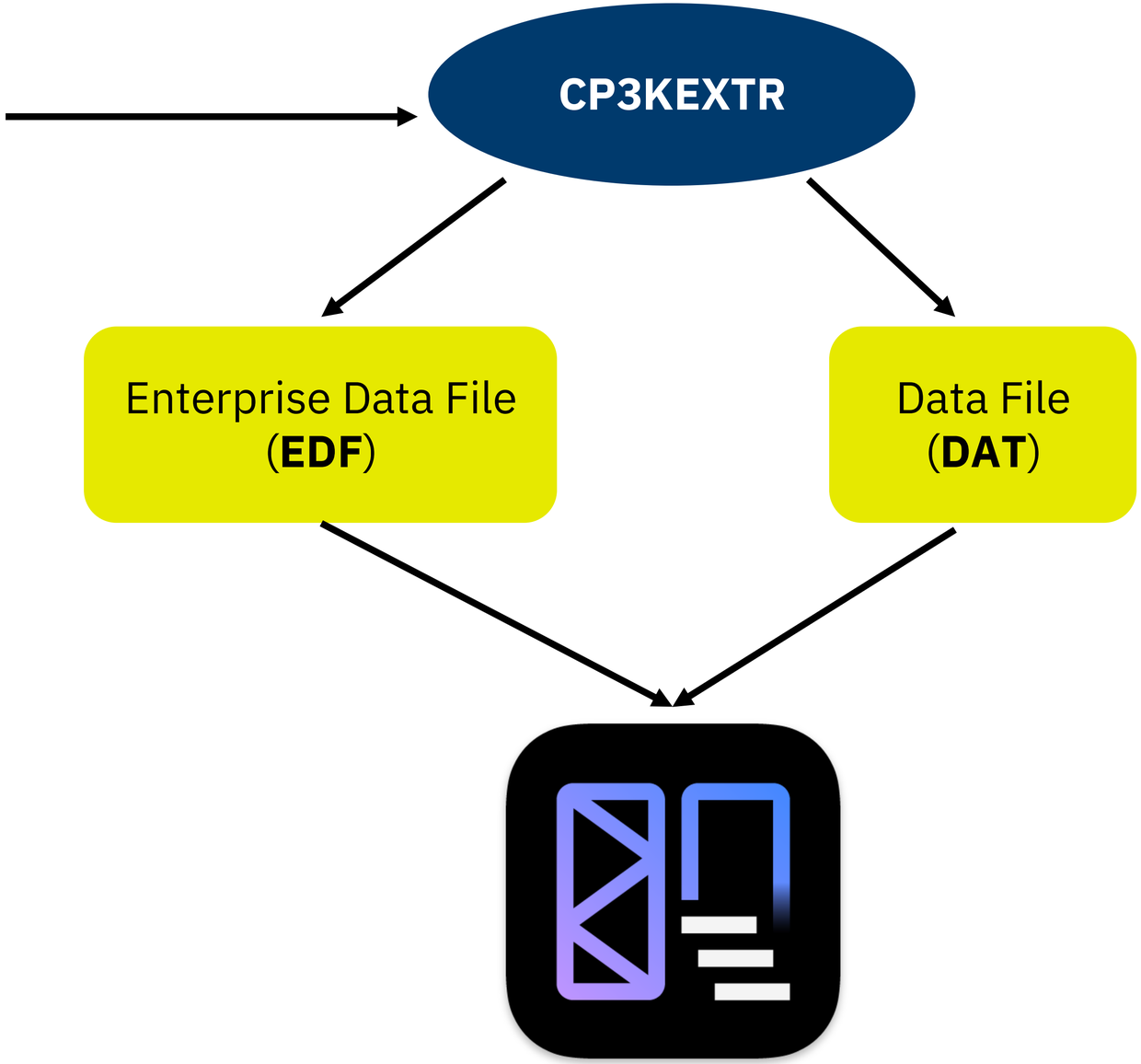
Collecting data for an IBM zBNA Study

SMF Data
14/15 – Dataset Activity
16 – DFSORT
30.4 – Step Level
30.5 – Job Level
42.6 – DFSMS Statistics
70 – CPU Activity
72 – Workload Activity
74 – Device Activity
78 – I/O Queuing Activity
113 – Hardware Reporting



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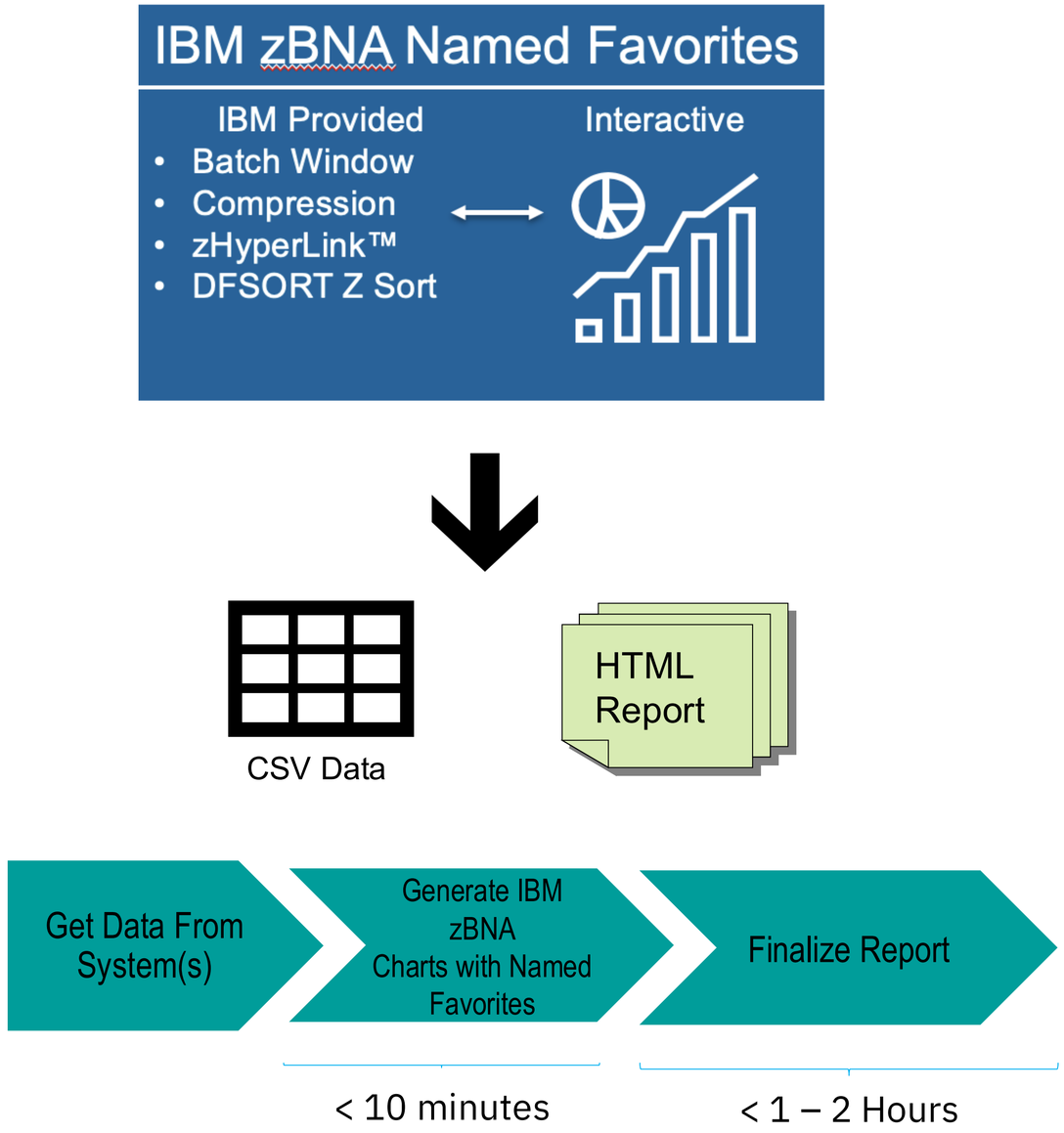
Process Data Fast and Report Specific Value



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IBM zBNA Enablement Webpage

A series of short enablement videos on using the tool is provided at: https://www.ibm.com/support/pages/zbna-enablement

Category	Topic	Time	Date	Feedback
Getting started	Loading Data	8m15s	03/10/22	★ Feedback
	Document Author and Save Options	4m53s	03/10/22	★ Feedback
	Global Time Filter	5m40s	03/10/22	★ Feedback
	Filter Import Export	11m34s	03/14/22	★ Feedback
	Named Favorites	8m10s	03/01/22	★ Feedback
	Modify Document	14m21s	03/08/22	★ Feedback
	New Filters Panel	7m52s	10/20/21	★ Feedback
	Alternate Processors	18m28s	03/14/22	★ Feedback
	Study File	4m06s	03/16/22	★ Feedback

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IBM zBNA Applications

Application	Description
Classic Batch	Analyze job statistics during a batch window. DFSORT job analysis.
Top Data Sets	Explore data set usage during a batch window.
Top Programs	Identify programs consuming the most CPU time.
BSAM/QSAM zEDC	Identify BSAM/QSAM zEDC candidates, estimate CPU cost or savings, and estimate DASD space savings.
Data Set Encryption	Identify DFSMS data set encryption candidates, estimate CPU cost to encrypt, and identify benefits of zEDC compression before encryption.
Coupling Facility Encryption	Identify Coupling Facility encryption structure candidates and estimate CPU cost to encrypt.
zHyperLink™	Identify data sets with zHyperLink™ eligibility and estimate response time improvement. **NEW**: IBM DS8000 G10 Support.
DFSORT IBM Z Sort	Identify sorts eligible for the IBM Integrated Accelerator for Z Sort on z15 and later. Estimate CPU and Elapsed time savings.

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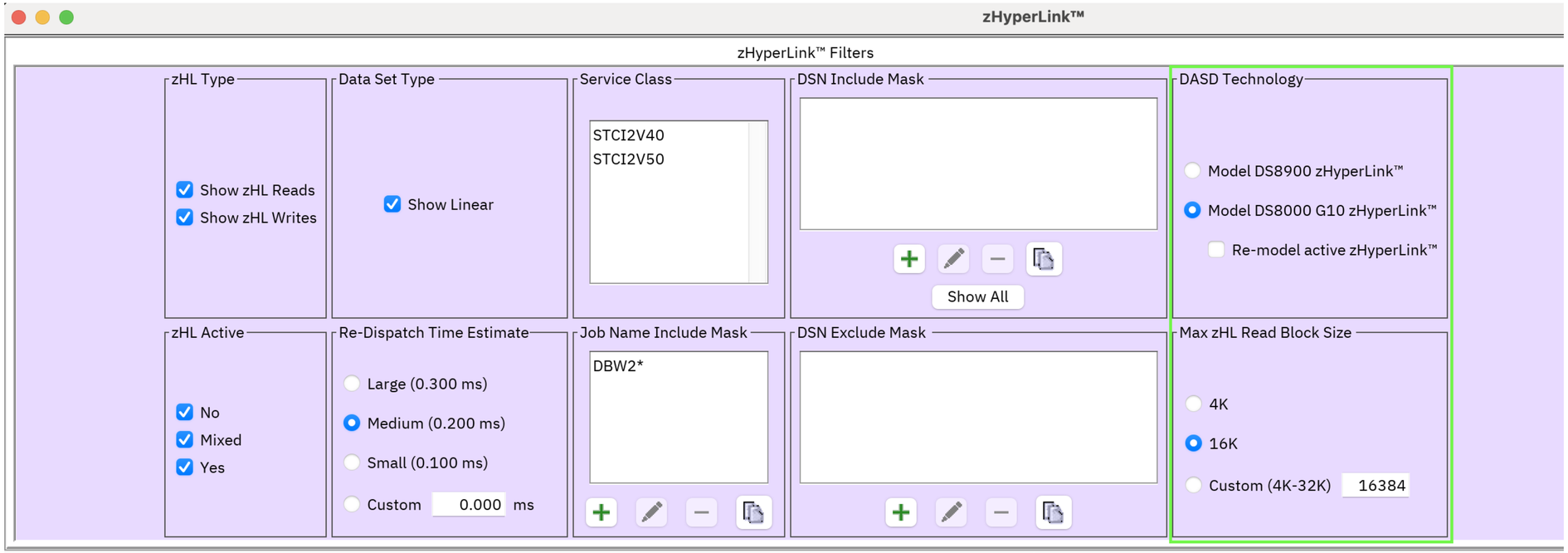
zHyperLink™ DS8000 G10 Support

IBM DS8000 G10 Announced 09/10/2024

New in IBM zBNA 2.6.0 (09/30/2024)

Additional enhancements in 2.7.0 (04/08/2025)



zHyperLink™ Table

Key DSN	Service Class	Job Name	Data Set Name	Storage Class	Type	Extended Format	Block Size	Total IO Number	Read %	zHL Active	% zHL Eligible	% zHL Hit	Avg. IO Response Time
	ALL	DBW2DBM1	DSNDBWG.DSNDBD.DSNDB06.SYSTSCOL.I0001.A001	DB2DATA	Linear	Yes	8,192	20,184	100.0%	No	46.4%	100.0%	0.272 ms
	ALL	DBW2DBM1	DB2DBWG.DSNDBD.DBITRK81.TSACTI81.I0001.A003	DB2DATA	Linear	No	8,192	1,816	100.0%	No	100.0%	84.8%	1.498 ms
	ALL	DBW2DBM1	DB2DBWG.DSNDBD.DBITRK81.TSACTI81.I0001.A009	DB2DATA	Linear	No	8,192	1,778	100.0%	No	100.0%	84.1%	1.284 ms
	ALL	DBW2DBM1	DB2DBWG.DSNDBD.DBITRK81.TSACTI81.I0001.A007	DB2DATA	Linear	No	8,192	1,777	100.0%	No	100.0%	85.7%	1.207 ms
	ALL	DBW2DBM1	DB2DBWG.DSNDBD.DBITRK81.TSACTI81.I0001.A015	DB2DATA	Linear	No	8,192	1,766	100.0%	No	100.0%	66.4%	2.621 ms
	ALL	DBW2DBM1	DB2DBWG.DSNDBD.DBITRK81.TSACTI81.I0001.A010	DB2DATA	Linear	No	8,192	1,748	100.0%	No	100.0%	85.4%	1.343 ms
	ALL	DBW2DBM1	DB2DBWG.DSNDBD.DBITRK81.TSACTI81.I0001.A006	DB2DATA	Linear	No	8,192	1,745	100.0%	No	100.0%	68.4%	2.584 ms
	ALL	DBW2DBM1	DB2DBWG.DSNDBD.DBITRK81.TSACTI81.I0001.A005	DB2DATA	Linear	No	8,192	1,733	100.0%	No	100.0%	84.0%	1.482 ms

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zHyperLink™ DS8000 G10 Support

Key Updates for IBM zBNA zHyperLink™ Analysis:

- IBM zBNA now estimates zHyperLink™ benefit on two generations of IBM DASD
  - DS8900 - Default and used in IBM zBNA prior to 2.6.0
  - DS8000 G10 – Must check the radio button in the DASD Technology Panel to enable

- DS8000 G10 provides several benefits over prior generation
  - Expected reductions to zHyperLink™ response times, especially for zHyperLink™ writes.
  - New default read block size limit of 16K. Can be configured up to 32K using Max Read Block Size filter.
    - DS8900 block size limit is 4K and cannot be changed.
    - zHyperLink™ Write block size limit is 4K even on DS8000 G10.

  - “Re-model active zHyperLink™” filter enables calculation of additional zHyperLink™ response time benefit for active zHyperLink™ data sets if migrating from DS8900 to DS8000 G10.

  - The estimated response time reductions assumes the IBM Z processor is connected to storage using a 150m cable, which is the longest length supported by zHyperLink™. This provides a more conservative estimate as shorter cable lengths are expected to provide a better response time benefit.

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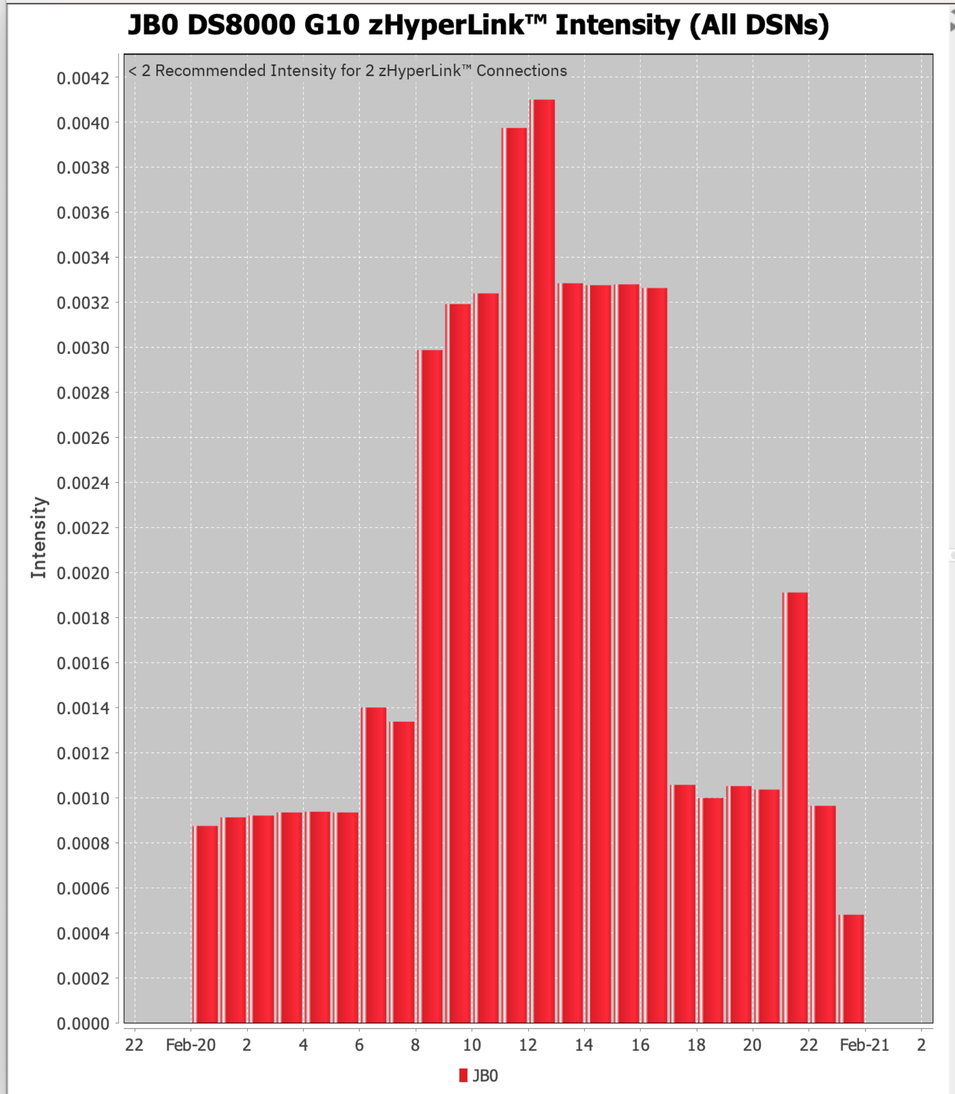
zHyperLink™ DS8000 G10 Support

New Chart: ZHL1004 – zHyperLink™ Intensity

zHyperLink™ Intensity : zBNA Graph and Text: ZHL1004



zHyperLink™ uses a zHyperLink™ I/O adapter to connect the zHyperLink™ cable to the storage system. Each zHyperLink™ I/O adapter card has two ports. For high availability IBM recommends at least 2 zHyperLink™ adapters (4 zHyperLink™ ports) and most configurations would use 2 connections between a specific CEC and Storage System.

For each zHyperLink™ port, there can be a total of 4 parallel I/Os. These 4 parallel I/Os can achieve a maximum intensity of 4 (I/O per second * Response Time (seconds)). The recommended intensity per port for "normal production" is 1 (25% of the 4 parallel I/O), because in the event that 1 adapter/port would fail, the resulting intensity would be still be 1 (utilizing 50 % of the remaining 4 parallel I/Os on the 1 remaining adapter).

This 50% utilization threshold per adapter is the maximum recommended to ensure consistent responsiveness and or throughput in this "degraded" I/O 1 adapter configuration. If the total intensity between a CEC and storage system exceeds 2, then adding an additional pair of zHyperLink™ connections should be considered to ensure adequate adapter capacity remains in the event an adapter failure.

If more than 1 system/LPAR plans to exploit zHyperLink™, the IBM zBNA Graph Aggregator should be used to sum up the intensity for all systems/LPARs that share the adapters. The sum of all systems/LPARs intensity should not exceed 1 for each zHyperLink™ port if 2 ports are being used.

The table below identifies the recommended intensity based on how many zHyperLink™ ports are used from a CEC to a single storage system, with the assumption of losing 1 adapter/port.

zHyperLink™ Connections	Max Intensity	Recommended Intensity	Percentage
2	8	2	25%
4	16	6	37.5%
8	32	14	43.75%

If more than one storage system is included in the data analysed, then divide the peak intensity by the number of storage systems to calculate the number of zHyperLink™ connections per system.

If you believe there is skew in the zHyperLink™ activity between the storage systems, then you might apply a factor to adjust for the difference in the activity levels.

Filters

Type	Filter
Time	Time Filters are not applied.
Data Span	2/20/18 00:03:27 to 2/20/18 23:58:43

Chart Commands

Zoom - Click and drag down and to the right OR use the scroll wheel

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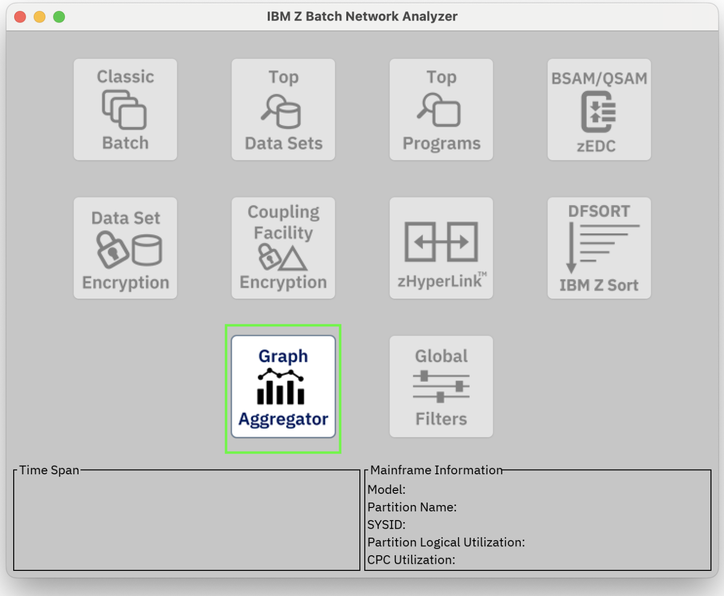
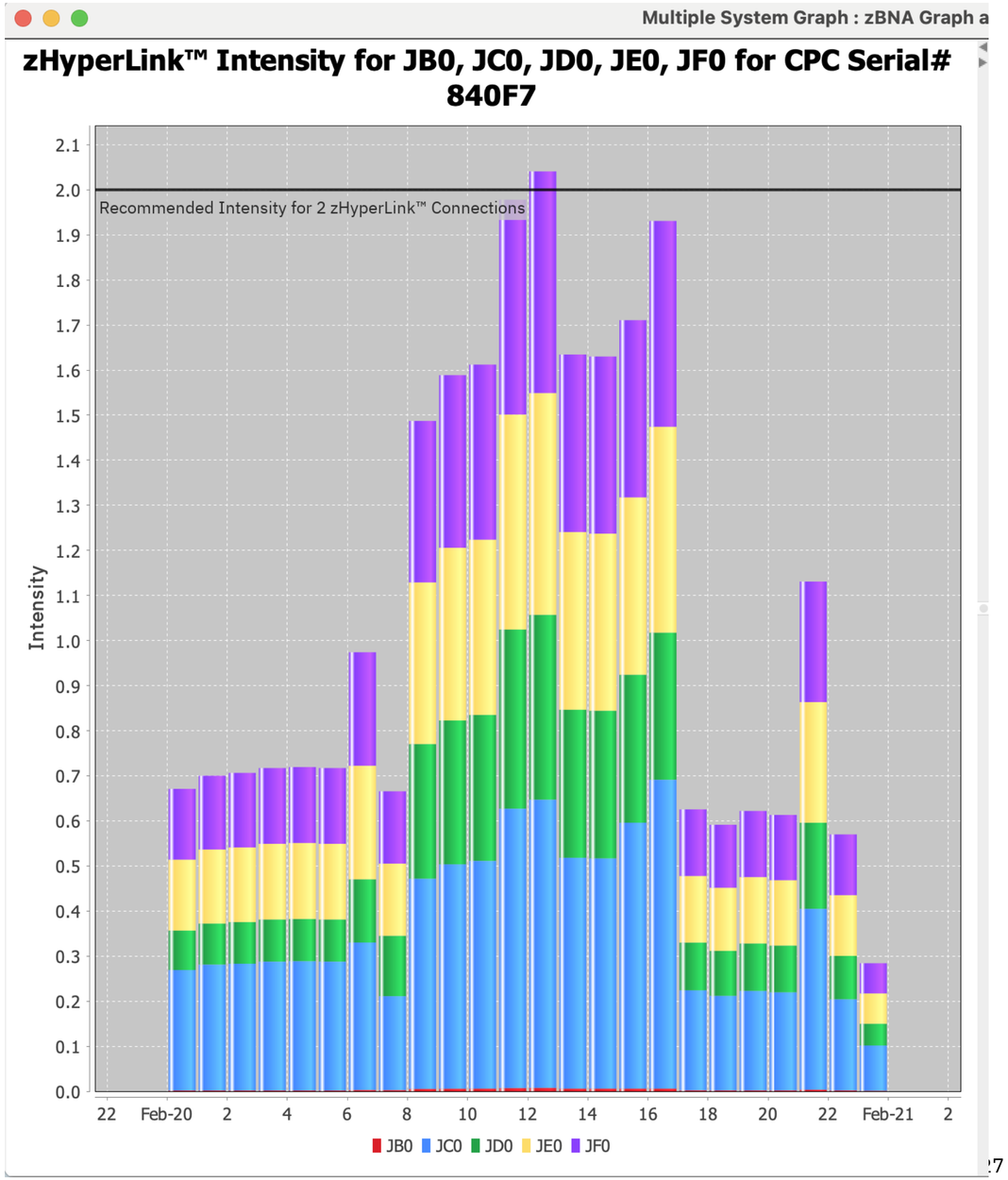
zHyperLink™ DS8000 G10 Support

New Chart: AGGZHL1004 – zHyperLink™ Intensity using Graph Aggregator





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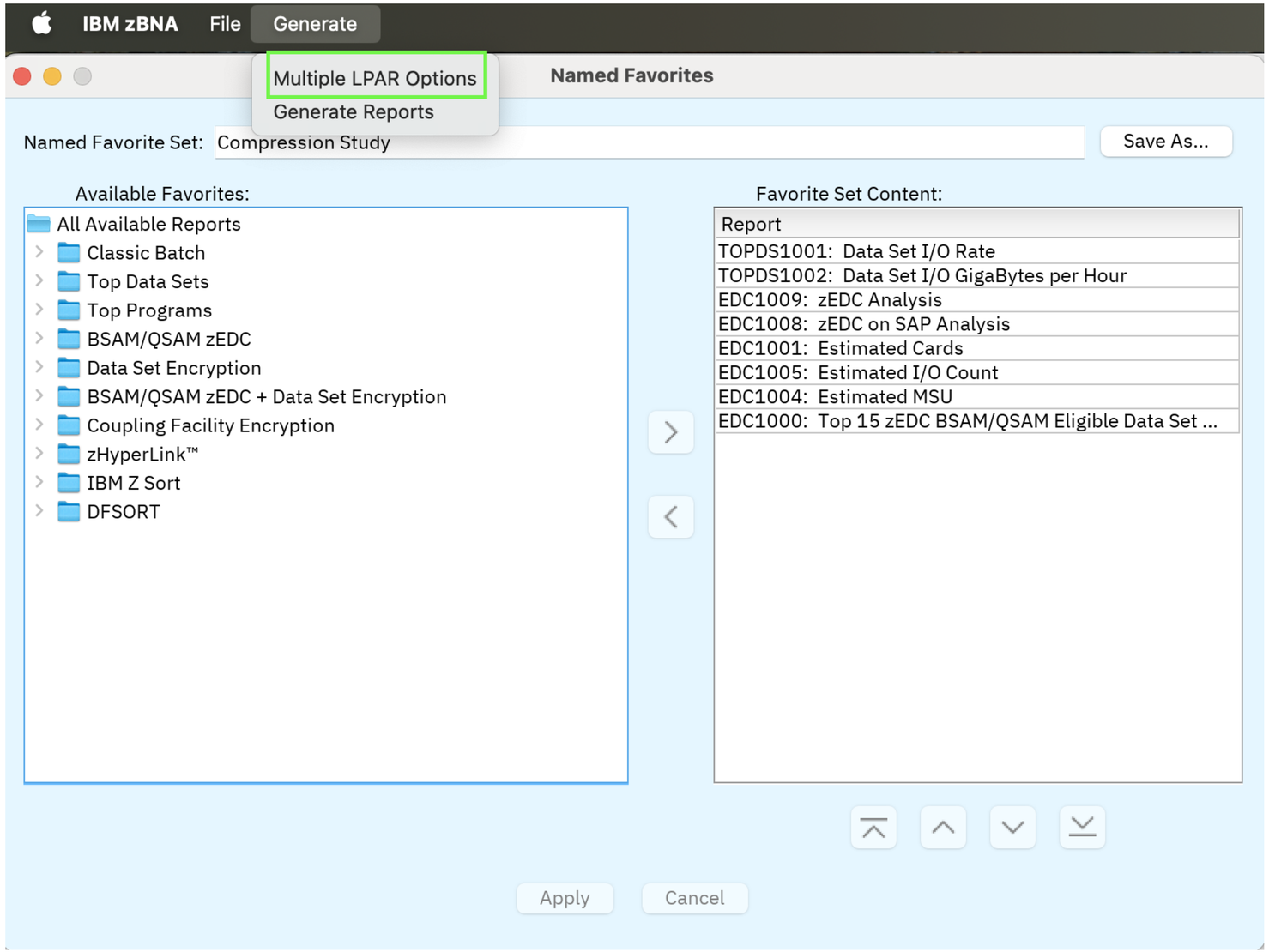
Named Favorites

Multiple LPAR Generate

New in IBM zBNA 2.6.2 (02/25/2025)



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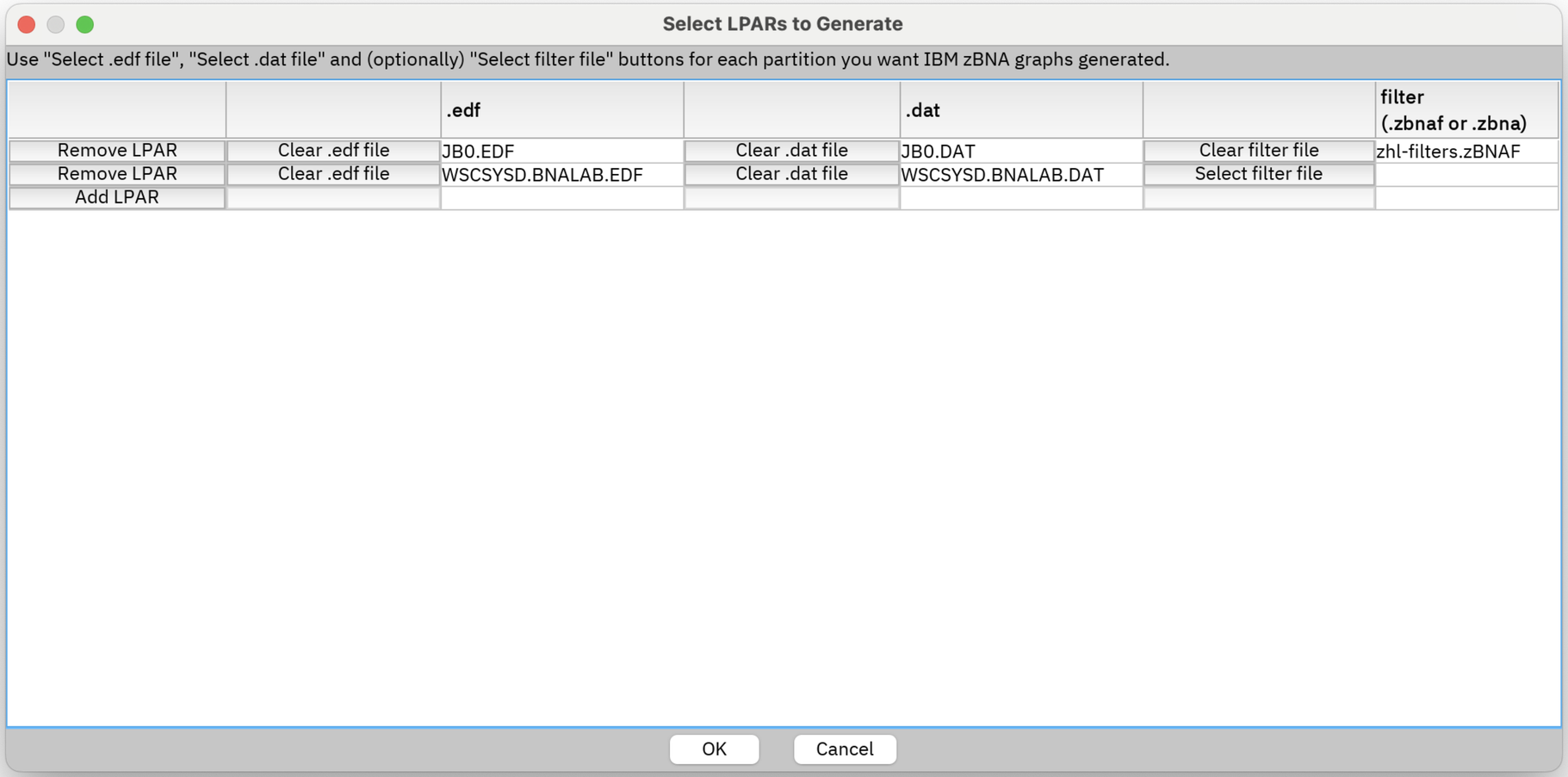
Named Favorites

Multiple LPAR Generate



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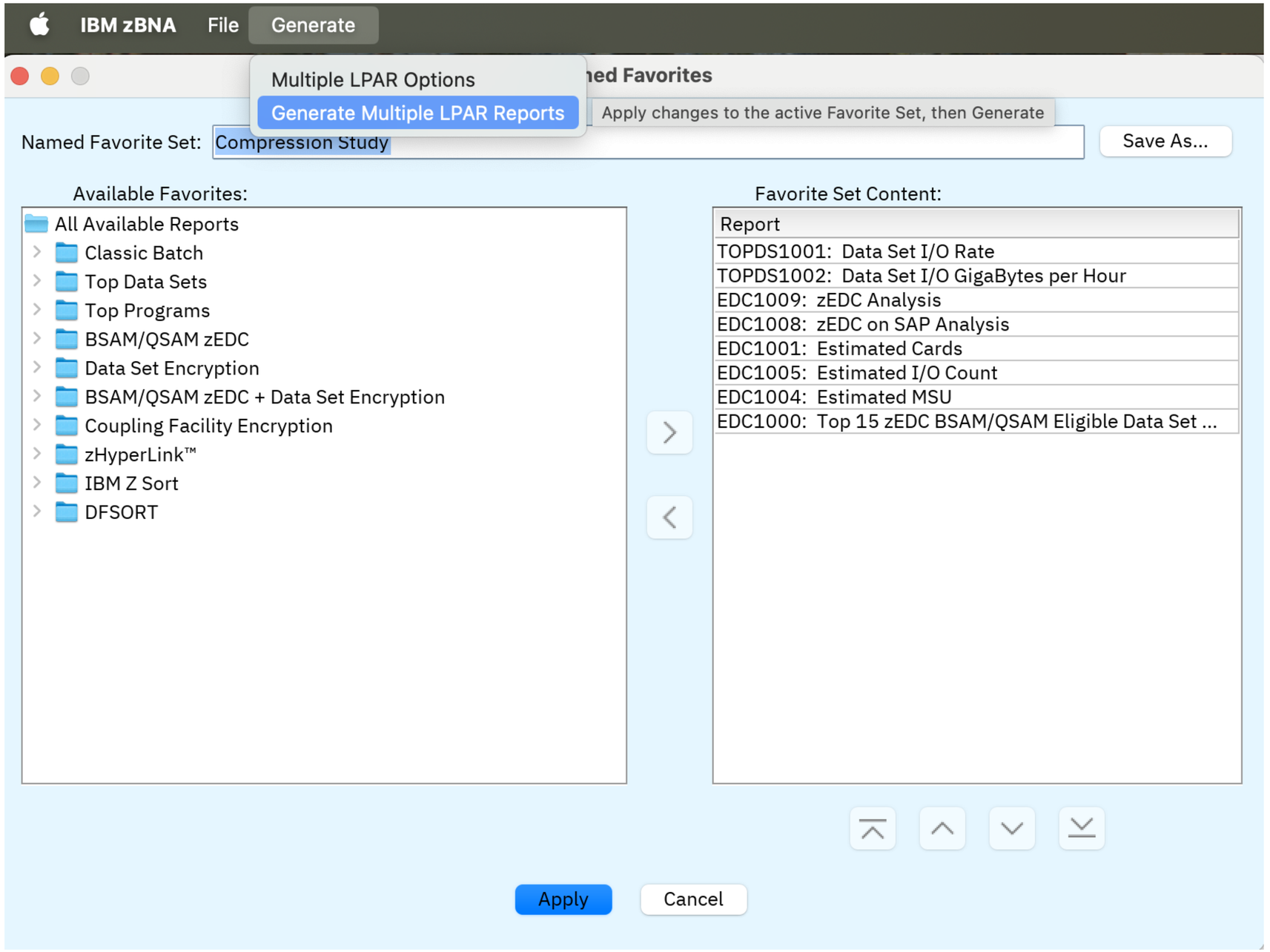
Named Favorites

Multiple LPAR Generate



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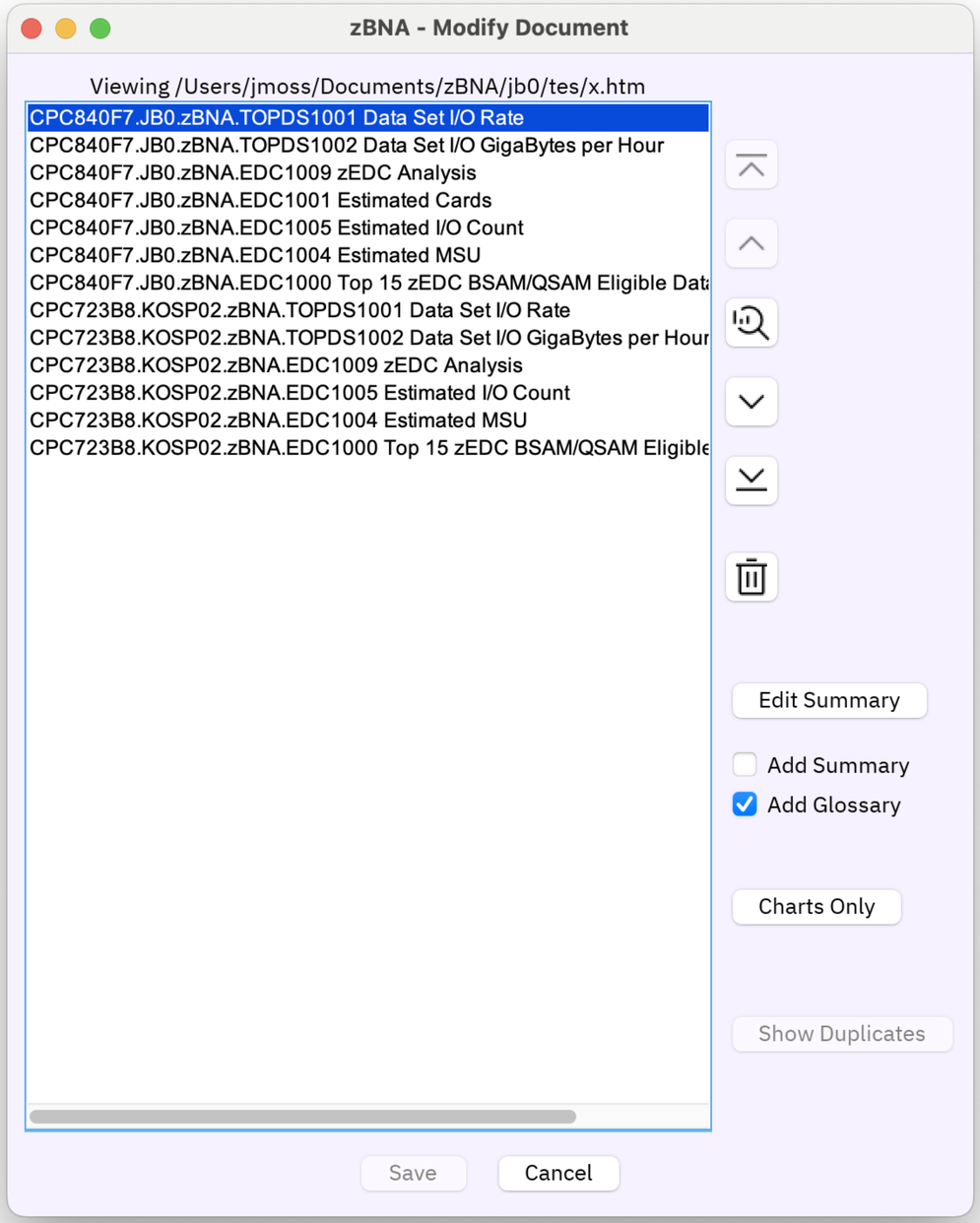
Named Favorites

Multiple LPAR Generate



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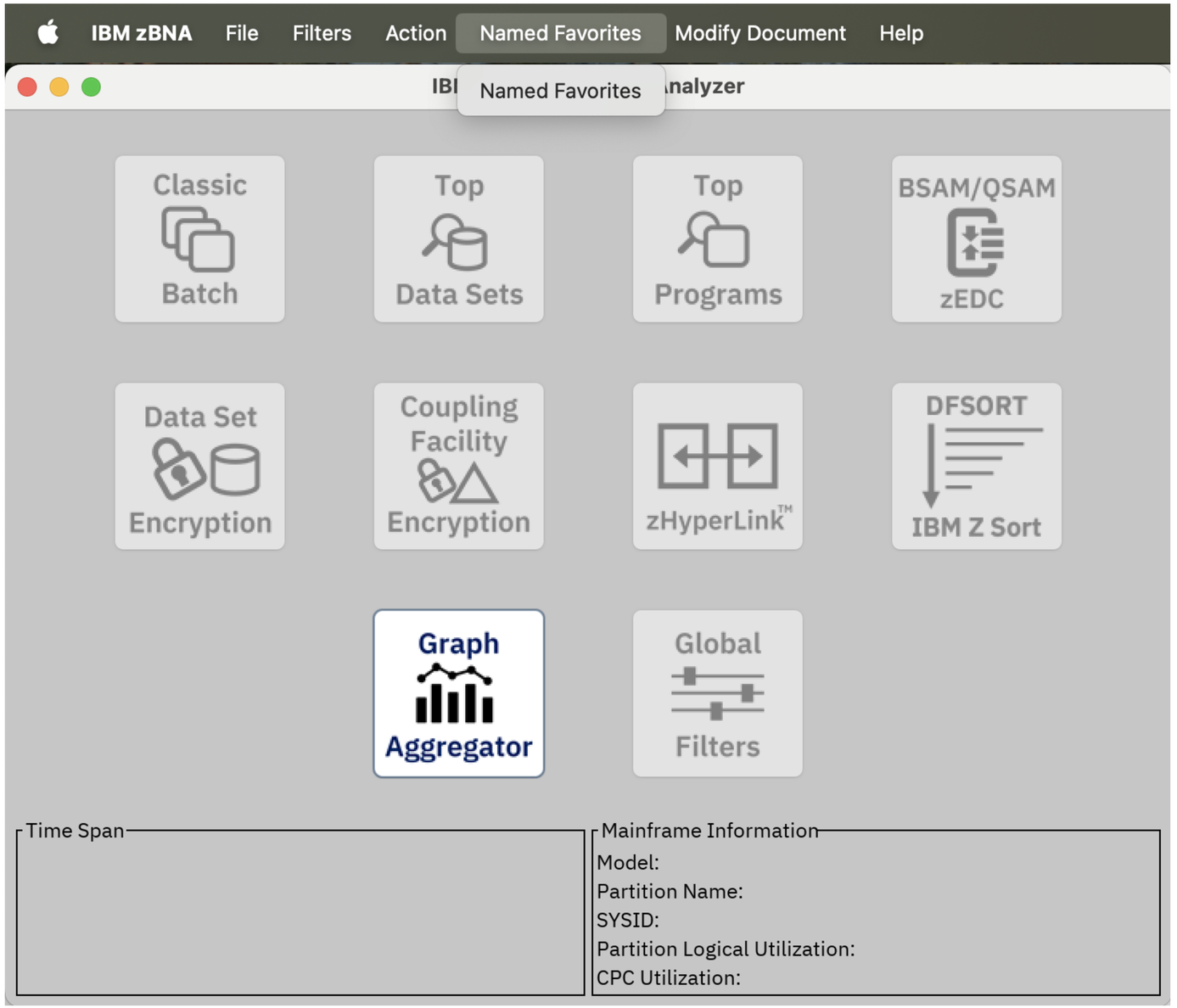
Named Favorites

Multiple LPAR Generate

No longer need to load EDF & DAT file to access Named Favorites Menu if Generating Multiple LPAR Reports



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Resources & Links

Multi-Image (MI) Processor Capacity Ratio table:
https://www.ibm.com/support/pages/ibm-z-lspr-itrrs

IBM zPCR: https://www.ibm.com/support/pages/node/6354029

IBM zBNA: https://www.ibm.com/support/pages/node/6354321

SMF Records: https://www.ibm.com/docs/en/zos/3.1.0?topic=smf-introduction

The IBM Data Extraction Program (IBM CP3KEXTR):
https://www.ibm.com/support/pages/node/6354221

User's Guides and Installation instructions for IBM zPCR, IBM zBNA and z/OS Data Extraction Program, at each link.

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