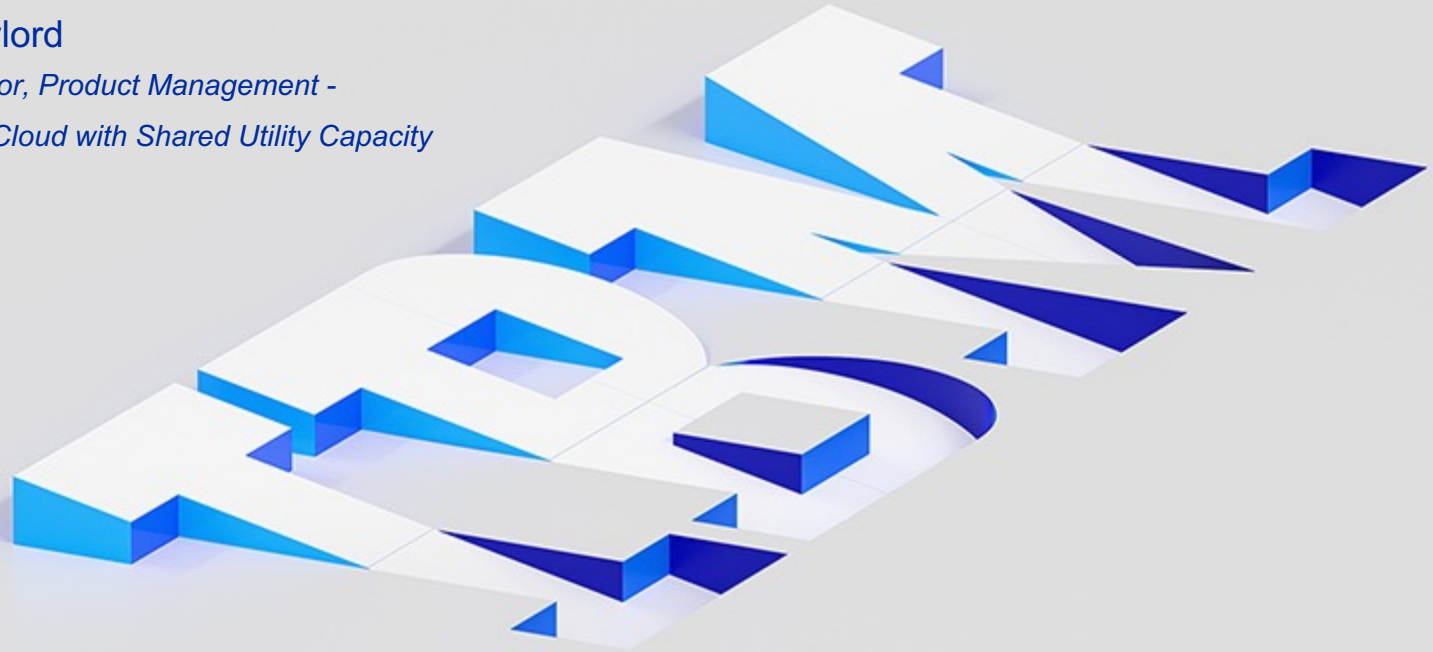
IBM Power Private Cloud Introduction

George Gaylord

Program Director, Product Management -

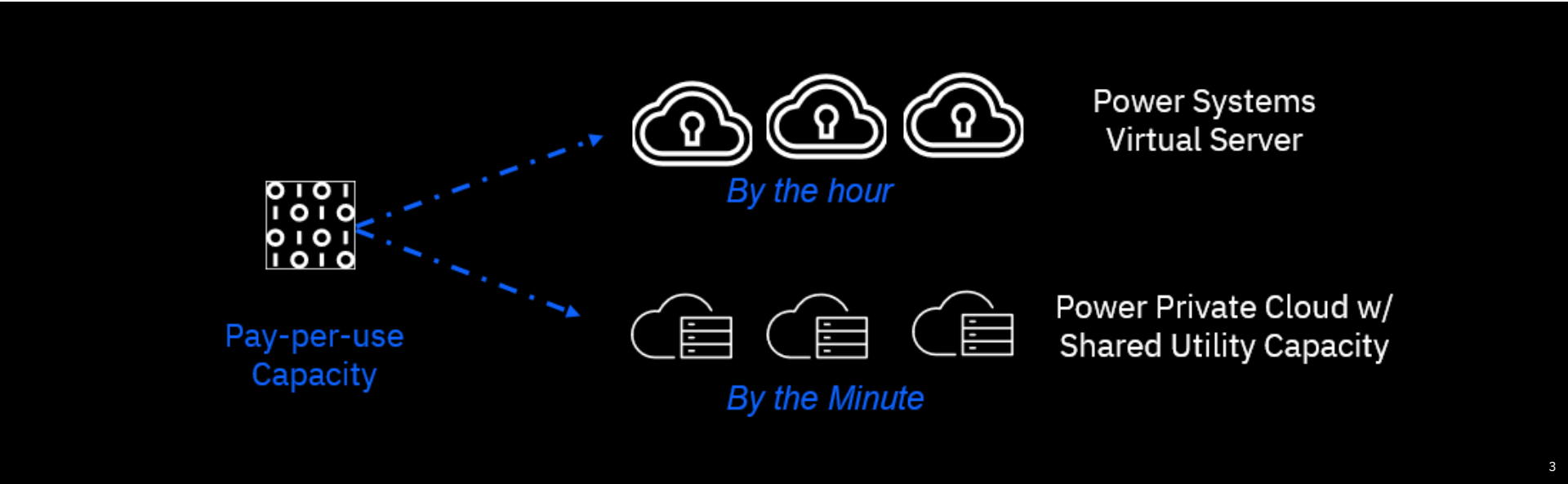
Power Private Cloud with Shared Utility Capacity



Accelerating your journey to hybrid cloud

Common technology, consistent operations, pay-per-use capacity available both on-premises & in the Cloud

- Modernize your applications and data across a distributed hybrid cloud environment
- Optimize your hybrid infrastructure to gain resiliency to support data from edge to cloud to core
- Secure your regulated data and applications and mitigate risks before they happen to protect core workloads

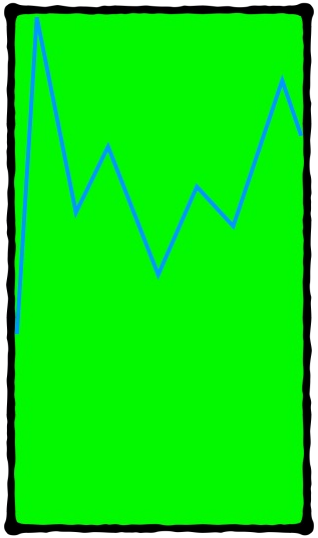


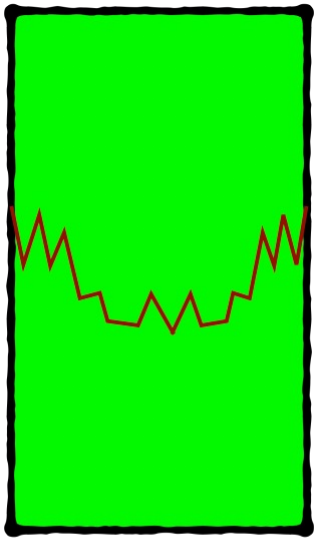
Deliver cloud economics on-premises with a Power Private Cloud infrastructure

IBM has led the industry delivering innovation for flexible consumption and sharing compute resources across large-scale, mission-critical production systems

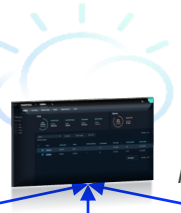
- *Capacity Upgrade on Demand* – permanent activations for seamless growth
- *On/Off Capacity on Demand* - temporary activations by the day
- *Elastic Capacity* – self-service temporary activations across an enterprise
- *Mobile Capacity* – share permanent activations across an enterprise
- *Shared Utility Capacity* – takes *Mobile* and *Elastic Capacity* to the next level
  - ✓ *Automated sharing of resource across a pool of up to 64 systems*
  - ✓ *Fully-active, standby pay-per-use capacity, metered by the minute*
  - ✓ *Graphical, real-time and historical usage monitoring and analysis*

In a traditional system infrastructure, each system must be individually provisioned for peak capacity





Power Private Cloud



IBM Cloud Management Console

When a Pool is started, all capacity above Base is activated and monitored by the CMC.

Metered Capacity

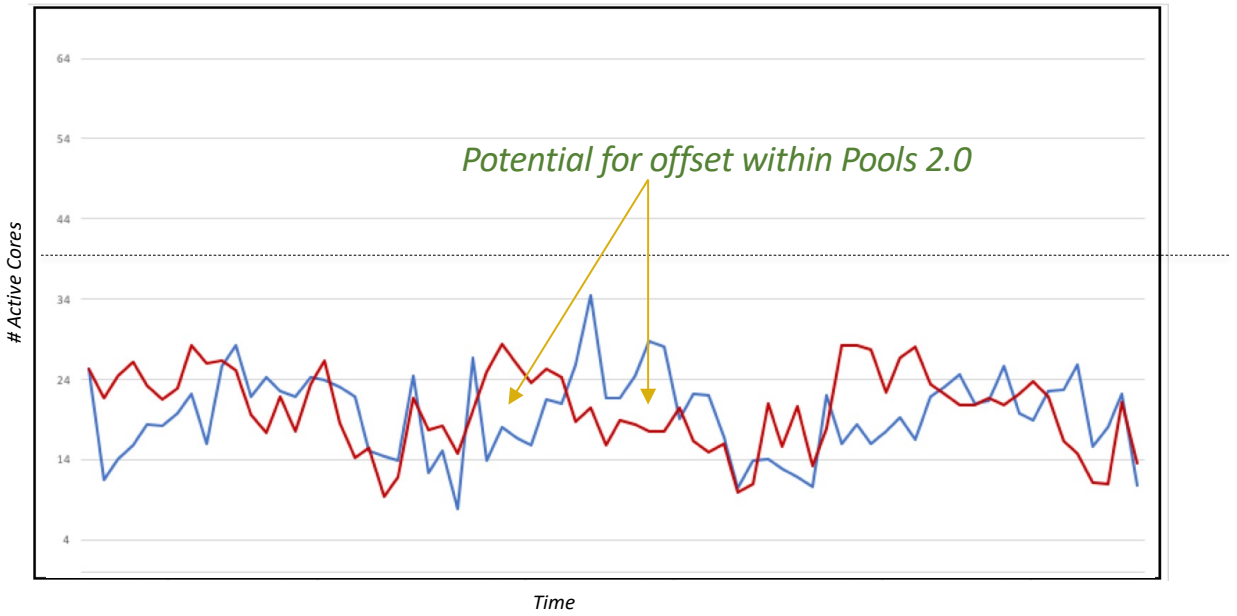
Shared Base Capacity

Minutes of Metered Capacity consumed above a Pool's aggregate Base are charged by the minute

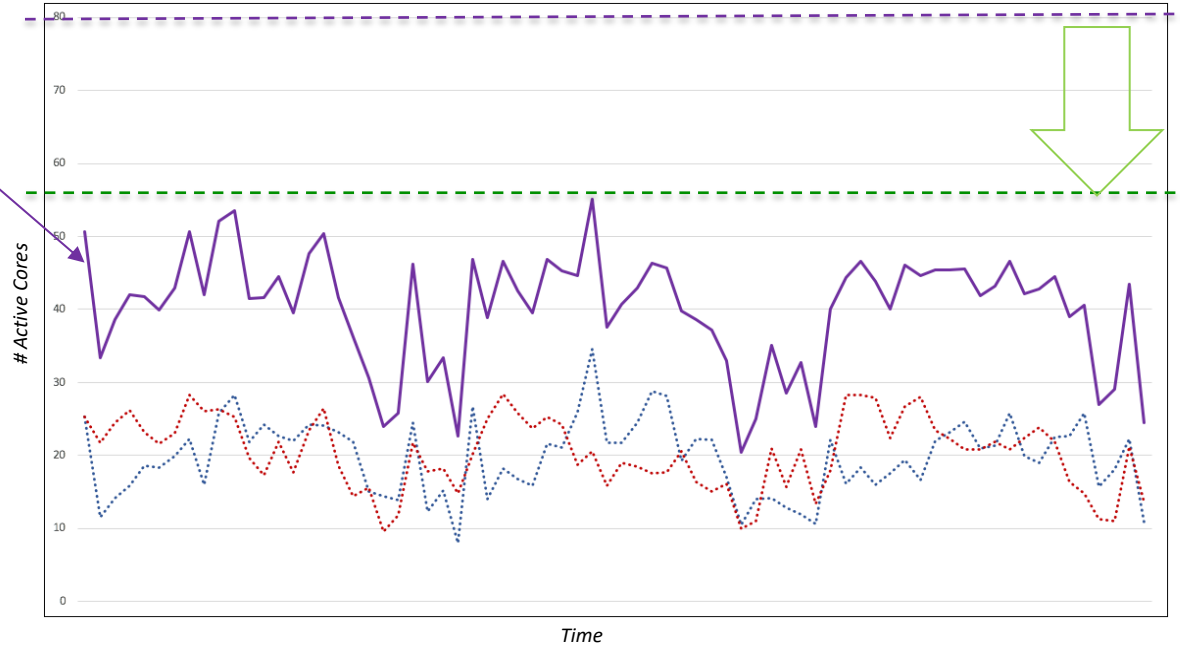
Base Capacity is aggregated and effectively shared across the Pool

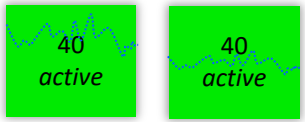
In a Power Private Cloud environment, each system may be configured optimally to support its expected average utilization, based upon the system's role in the infrastructure

Potential Metered Capacity consumption charges on one system may be offset by available (idle) Base Capacity on another system



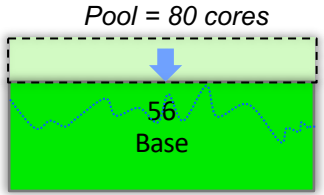
Shared Utility Capacity provides unique innovation designed to *optimize resource utilization* and *reduce the expense of handling volatile and peak demand* across a collection of Power servers, *while maintaining service level*





System A

System B



System A System B Pool 1

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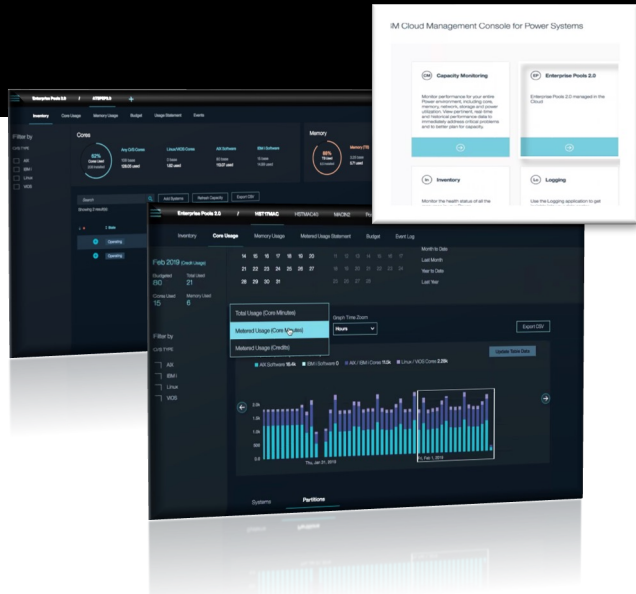
Power Private Cloud with *Shared Utility Capacity*

Fully active, metered by the minute



Deploy *Shared Utility Capacity* across a collection of Power systems

- Purchase Power10 and/or Power9 systems with *Base Capacity*, which is aggregated and effectively shared across the pool
- Remaining capacity on each server is activated when a pool is started and seamlessly available as *Metered Capacity* by the minute
- IBM Cloud Management Console with HMC monitors minutes of resource use that exceed the pool's Base capacity
- Minutes of Metered Capacity consumed may be invoiced at the end of each month* or debited against pre-paid Capacity Credits
- Up to 64 systems and up to 4,000 VMs may be supported in a single pool

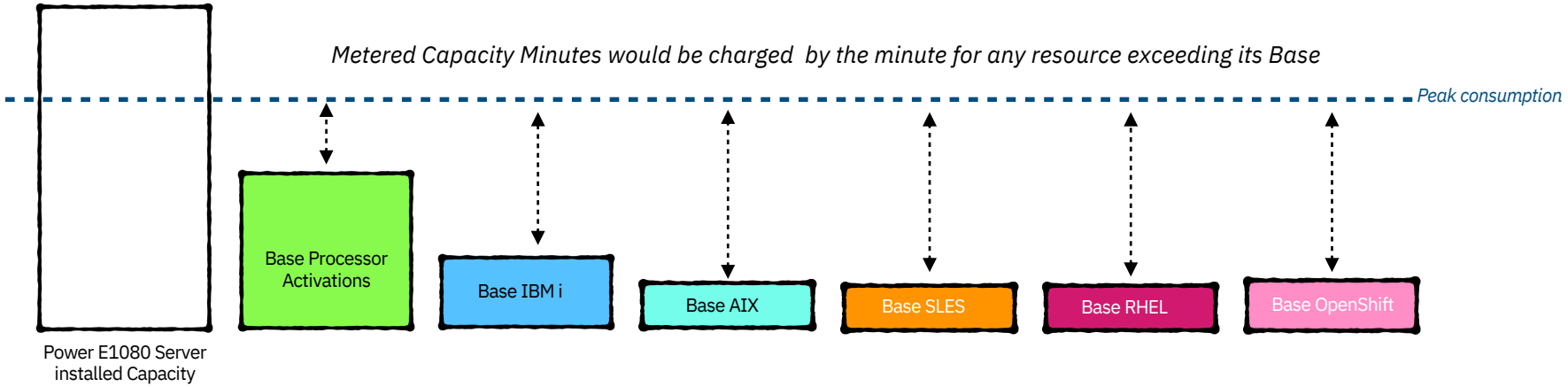
*Initial availability of Monthly invoicing of Metered Capacity in 2Q22 in NA, on-shore EUR and selected off-shore EUR and MEA countries.

Base and Metered Capacity elements

- Processor activations
- Memory activations*
- AIX and IBM i entitlements
- SLES subscriptions***
- RHEL subscriptions***
- OpenShift Container Platform***

**Base Memory activations are available on high-end and midrange systems
***Subscriptions sold via IBM as Program Products with supported features included.

Each hardware and software resource in a Power Enterprise Pool is independently monitored and evaluated vs. its Base each minute

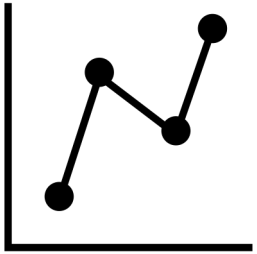


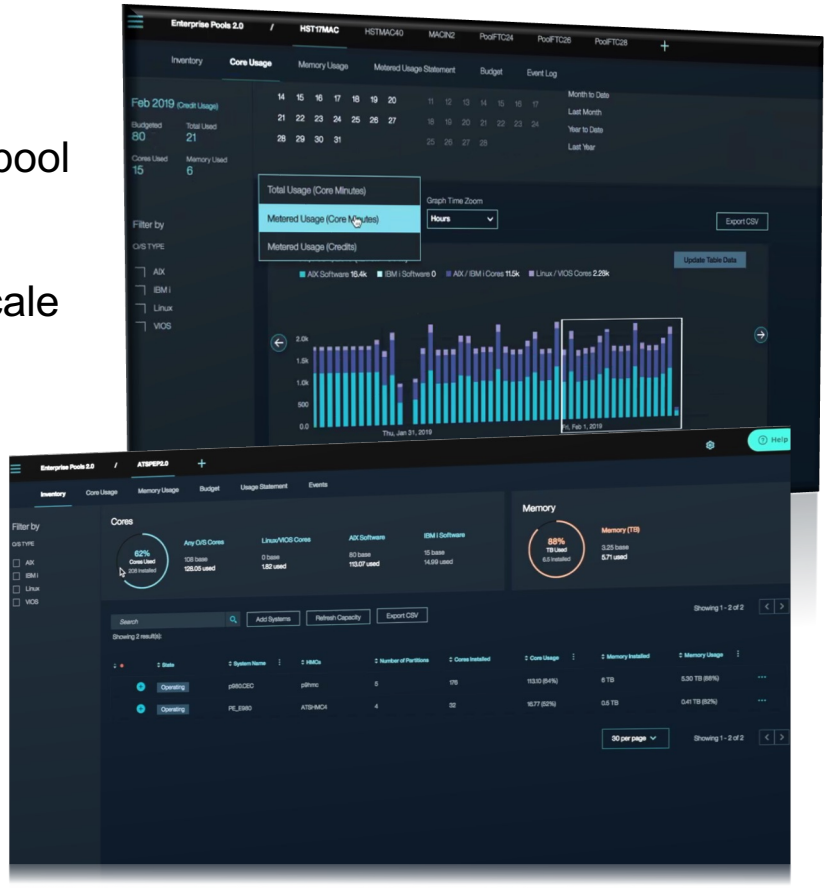
Shared Utility Capacity Additional Detail

- ✓ Core and memory usage are tracked by the minute and aggregated across the pool
  - Based on average usage for the minute, not peak
- ✓ Memory is tracked based on assignment of resources to active partitions and is not based on OS usage of the memory
- ✓ CPU is tracked based on actual consumption by shared processor partitions and dedicated donating partitions
  - Dedicated not donating partitions are charged at 100% CPU allocation
- ✓ No turning on/off or moving of resources

Cloud Management Console

- Dynamically add & remove supported systems to a pool
- Monitor and maintain monthly operating budget
- Analyze trends within a pool using adjustable timescale
- Gain stronger insights into resource utilization

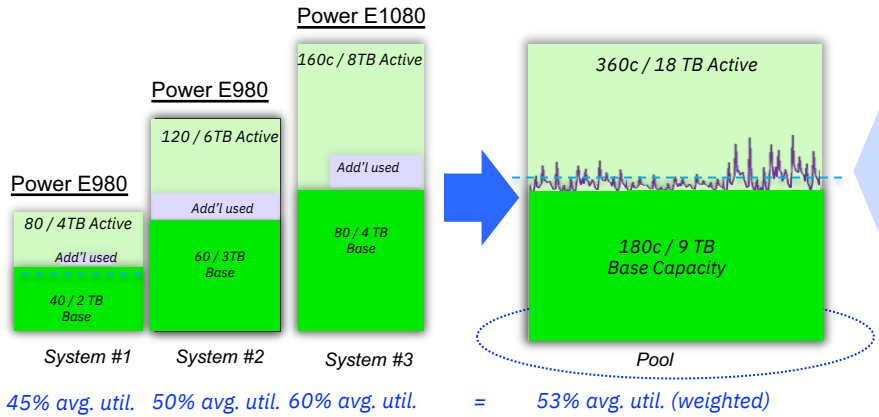




Power Private Cloud with Shared Utility Capacity offers the complete range of options to tailor an optimal mix of Base vs. Metered capacity to meet client objectives

Optimize for TCO

Optimize overall costs and improve service level and overall TCO with automated resource sharing of Base Capacity across the pool and fully-active Metered Capacity for minutes used above a pool's Base resources.

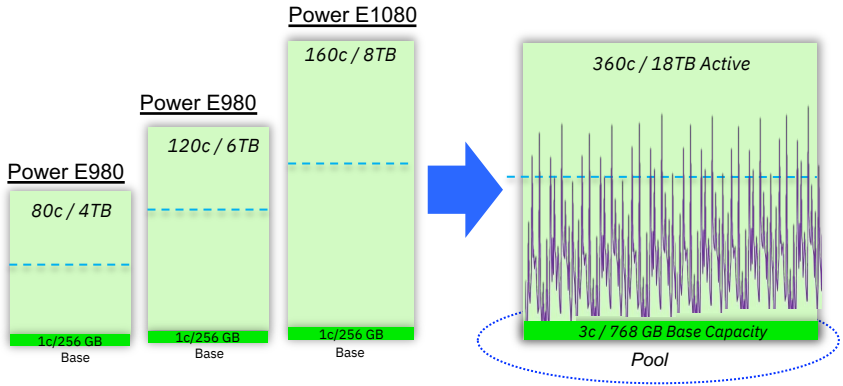


- Larger Base Capacity which is shared across the pool to maximize ROI
- Minimal or balanced Metered Capacity typically for spikes or variance/volatility over time

Range of Options

Optimize for Pay-per-use

Reduces initial system acquisition price and offer a pay-for-use consumption model that delivers compute resources via Metered Capacity by the minute



- Minimal Base Activations for lowest initial system price
- Reduce initial investment / shift to pay-per-use
- Significant Metered Capacity by design

Power Private Cloud with *Shared Utility Capacity*

Seamless, multi-system resource sharing & fully-active, pay-per-use capacity by the minute

Planned* 4Q23 enhancements

- *IBM i license entitlement resource will now be monitored by each software tier (P10, P20, P30) within a scale-out system pool*
- *PowerHA license entitlements are now enabled as new, individual Base and Metered Capacity software elements, discrete from their associated operating systems.*
- *The latest RHEL and RHEL for SAP for Power subscription PIDs are supported as Base and Metered Capacity software elements when purchased as Licensed Program Products with required features from IBM or an authorized IBM Business Partner.*
- *IBM i operating system and IBM i Licensed Program Product (LPP) entitlements associated with Virtual Serial Numbers may now be deployed on systems in a Power Enterprise Pool.*
- *An existing Power Enterprise Pool may be dynamically changed to specify that any charges for Metered Capacity consumption should be invoiced on a monthly basis rather than debited from pre-paid Capacity Credits on account.*

Cloud Management Console

IBMi AIX

Red Hat SUSE

PowerVM

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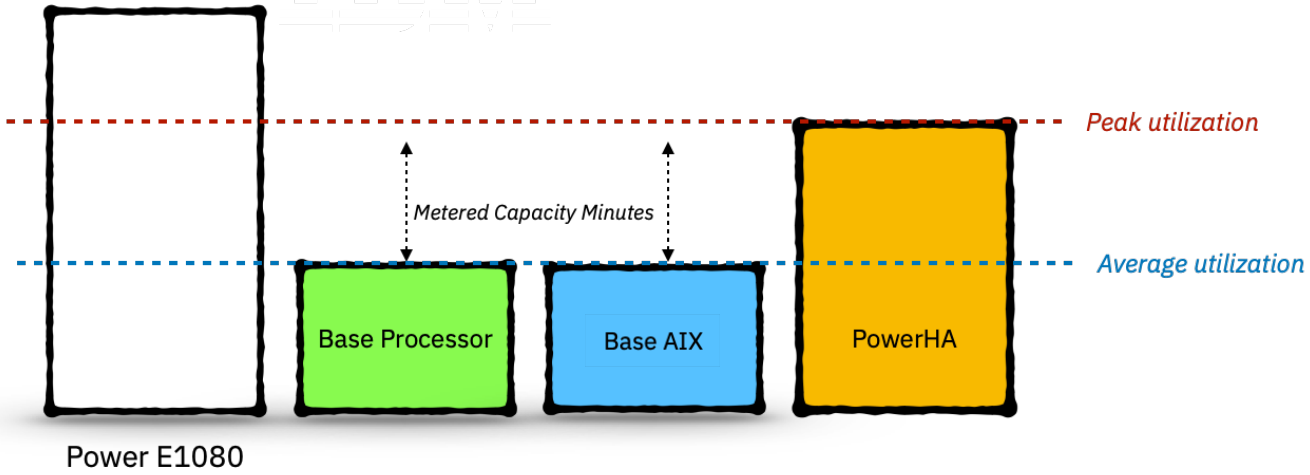
Planned* Power Private Cloud enhancement for PowerHA

- Typically PowerHA SystemMirror is entitled in a quantity to support the peak capacity required across systems in an infrastructure



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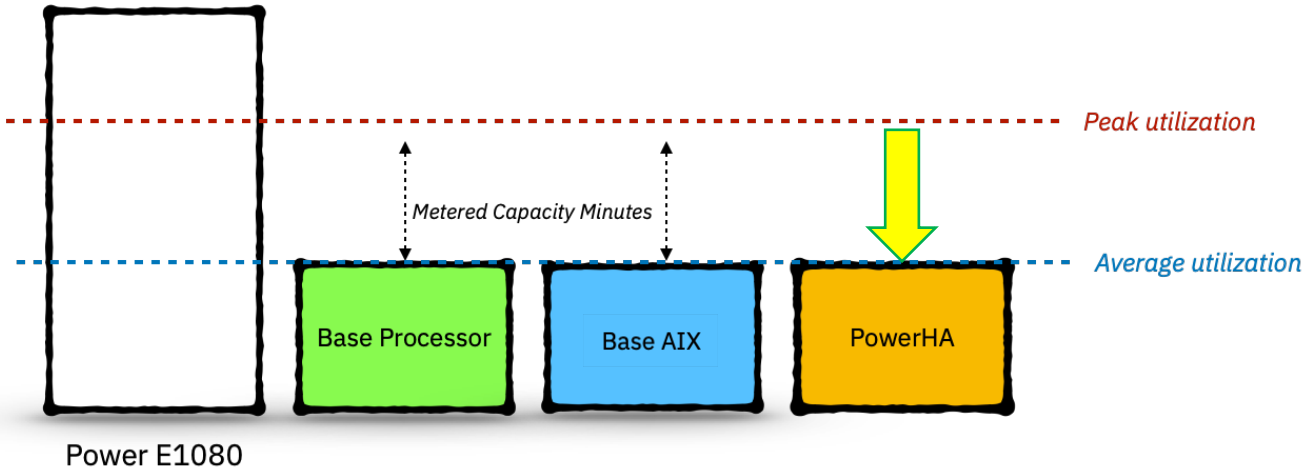
Planned* Power Private Cloud enhancement for PowerHA

- IBM plans to enable PowerHA SystemMirror for AIX and PowerHA SystemMirror for IBM i as unique Shared Utility Capacity Software resources, independent of AIX entitlement

- Base PowerHA entitlement of a pool may then be be less than aggregate # of OS license entitlements required to support peak utilization

- Core capacity in VMs in a pool that exceeds Base PowerHA entitlement aggregate will be charged as minutes of PowerHA Metered Capacity of the relevant Edition
  - *Prerequisite*: All VMs running PowerHA must be tagged for monitoring by Cloud Management Console



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Power Private Cloud with Shared Utility Capacity enhancements for IBM i license entitlements

- ✓ With Cloud Management Console V1.20, clients may now deploy a mix of 2-socket scale-out Power systems with processors requiring P10, P20 and/or P30 tiers of IBM i license entitlement within the same pool without having to acquire all Base Capacity IBM i license entitlements at the highest tier required for processors within the pool.
  - Prior to this announcement, only a single IBM i software tier of license entitlement is monitored within each Power Enterprise Pool.
- ✓ New Metered Capacity rates and feature updates to 5770-SSM enable Entitled Systems Support to debit or charge minutes of IBM i license entitlement Metered Capacity consumption by individual P10, P20 and/or P30 tier.
- ✓ In addition, IBM i operating system license entitlements and/or subscriptions associated with Virtual Serial Numbers vs. physical system serial numbers may now be added to a Power Enterprise Pool as IBM i Base Capacity. Virtual serial numbers can help clients simplify administration of Licensed Program Product entitlement keys and movement of IBM i logical partitions between systems.

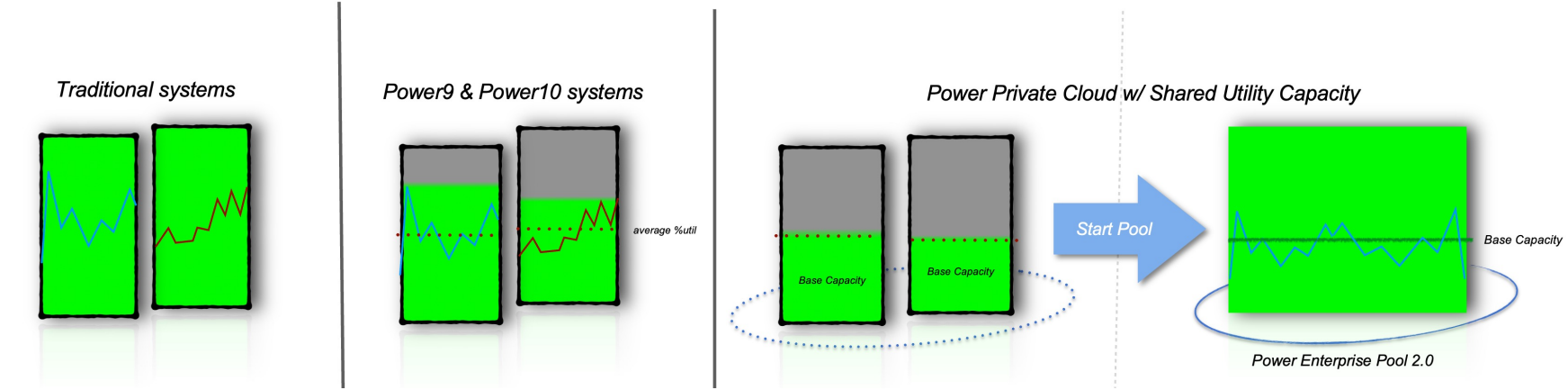
Each IBM i software tier of license entitlement will be monitored and metered as a discrete Shared Utility Capacity software resource

Reference : Requirements for Shared Utility Capacity

- One or more Power E1080/E980, E1050/E950 or 2-socket S1022/S1024/S922/S924 (G) systems
- ONE single machine class is allowed per pool
  - *For example : 5 x E1050 in one pool, 3 x E1080 in another pool.*
- Supported Power10 and Power9 systems may interoperate within a single pool.
- All machines within a pool must be in the same enterprise and geopolitical country
- A minimum of 1 Base Processor Activation is required on each system within a pool.
- A minimum of 256GB of Base Memory Activation is required on each system within a pool.
- A maximum of 4,000 VMs and up to 64 systems in a pool managed by a single CMC, with up to 1,000[1] virtual machines supported per HMC managing a Power Enterprise Pool 2.0.
- Cloud Management Console subscription & connection are required
  - *All HMCs managing servers within a Pool require Network Time Protocol (NTP) to be enabled*
  - *Performance and Capacity Monitoring (PCM) must be enabled via HMC for each server in a Pool*
- Hardware & Software Maintenance are required on all systems

Power Private Cloud with *Shared Utility Capacity*

Increase responsiveness and deliver cloud economics on-premises, with a Power Private Cloud infrastructure



- Repeated procurement cycles increasing time to value
- Sub-optimal resource utilization with over or under-provisioned capacity
- High upfront investment
- Limited flexibility to scale up and down over time

- Capacity Upgrade on Demand – permanent activations
- Elastic Capacity – temporary activations by the day
- Mobile Capacity – share permanent activations within a pool
- Instant, non-disruptive response to business changes

- Shared Utility Capacity takes Mobile and Elastic Capacity to the next level
- Optimize resource utilization to reduce compute capacity costs by 20-30% with seamless, multi-system resource sharing
- Lower initial system price by over 50% and access fully-active standby resource as pay-per-use capacity, by the minute
- Real time & historical usage monitoring and analysis via the Cloud Management Console

Power Server Metered Capacity Resource Rates **# Minutes: 1 Capacity Credit**

Processor and Memory Activations	Power E1080 / E980	Power E1050 / E950	Power S1022 / S1024 Power S924 / S924
1 Processor Core Activation (AnyOS)	35,000	120,000	150,000
1 Processor Core Activation – Linux®/VIOS only	88,000	180,000	N/A
1GB Memory Activation	3,600,000	15,000,000	N/A

Power Software Metered Capacity Resource Rates **# Minutes: 1 Capacity Credit**

AIX and Linux Software Entitlements	Medium Tier	Small Tier (per core)
AIX® software (per core)	30,000	60,000
SUSE Linux Enterprise Server for Power software (per core)	70,000	90,000
Red Hat® Enterprise Linux for Power software (per core)	70,000	90,000
Red Hat OpenShift® Container Platform for Power software (per core)	22,000	23,000

IBM i Software License Entitlements	P30 Tier	P20 Tier	P10 Tier
IBM i software (per core)	2,200	3,000	6,500

PowerHA Software Entitlements	Medium Tier	Small Tier
PowerHA SystemMirror for IBM i software (per core)	23,000	32,000
PowerHA SystemMirror for AIX - Enterprise Edition software (per core)	23,000	32,000
PowerHA SystemMirror for AIX - Standard Edition software (per core)	30,000	38,000

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