資訊精算總體持有成本分析
IT Economics TCO Study

廖學國 Alex LIAO
資深顧問 IBM 全球競爭力辦公室亞太區
+886-919327018， liaohk@tw.ibm.com
IT.Economics@us.ibm.com

IT Economics presence world wide

World wide and local teams expert in IT Economics methodology and on-site client consulting

IT Economics consultants staffed in 14 countries across all GEOs

IBM Competitive Project Office

Craig Bender, Director
IBM Competitive Project Office
IT Economics Consulting & Research
Armonk, NY, USA

Americas

Gregory Sechuga
IBM IT Economics Team
Manager for the Americas
Carmel, IN, USA

EMEA

Alfredo Micarelli
IBM IT Economics Team
Manager for EMEA
Rome, Italy

Asia Pacific

Bruno Barbosa
IBM IT Economics Team
Manager for Asia Pacific
Singapore

IBM IT Economics Team

IT Economics assessments - IBM Z and LinuxONE

Use an IT Economics assessment to quantify business values, technical requirements and costs

 **Workload Placement** • Consolidate, offload, and place workloads on alternative platforms • Exploit and compare platform attributes to optimize workload performance and costs	 **IBM LinuxONE** • Assess x86 Linux workload requirements • Quantify business impact of LinuxONE™ for First Time Enterprise users
 **Hybrid Cloud** • Analyze enterprise requirements for hybrid and multicloud solutions • Identify infrastructure modernization opportunities with IBM Cloud™ Private	 **Tailored Fit Pricing for IBM Z Assessment** • Use historical data to develop an accurate cost forecast • Examine IBM Z capabilities and costs against cloud alternatives
 **Security Cost** • Examine sources of security costs in IBM Z production and non production environments • Evaluate encryption technologies to lower security risks and IT operations overhead	 **Blockchain** • Examine impact of a transparent and immutable hyperledger for transactions for client specific use cases • Analyze advantages of IBM Blockchain
 **Machine Learning** • Discover how to provide an enhanced customer experience through real-time predictions from ML • Evaluate data gravity and deploy machine learning closest to the data and transactions	 **Chargeback Analysis** • Align chargeback policies to actual IT costs • Identify and overcome chargeback policies that drive adverse IT decisions
 **SW Portfolio Analysis** • Review software currency and potential replacement with other products to optimize IT spend • Examine migration steps and services to ensure successful transition	 **IT Best Practices Benchmarking** • Compare actual IT environment with best practices in the IT industry • Improve forecast and actual spend
 **Container Usage Analysis** • Evaluate IBM Z container usage to optimize costs • Compare container and non-container scenarios for workload growth	 **Enterprise DevOps** • Analyze challenges in existing application delivery practices • Identify the most effective enterprise DevOps solution for improved agility, time to market and quality

IT Economics studies are available at no-charge to IBM clients and Business Partners
Visit www.ibm.com/iteconomics or https://www.ibm.com/partnerworld/iteconomics

Contact the IBM IT Economics Team
IT.Economics@us.ibm.com

IT Economics assessments - Power Systems

Use an IT Economics assessment to quantify business values, technical requirements and costs

	**Workload Placement** • Consolidate workloads onto the latest technology • Evaluate the impact of running and deploying new workloads on POWER versus alternative platforms (x86, Exadata, AWS, Azure, etc.)
	**SAP HANA** • Analyze requirements to move traditional SAP landscapes to SAP HANA • Assess TCO and BVA of SAP HANA on POWER compared to x86 and cloud
	**Security Engagement** • Use quantitative risk analysis to calculate value and exposure of assets • Evaluate new encryption technologies to improve the cost and effectiveness of security
	**Data Science** • Discover how to provide an enhanced customer experience through real-time predictions from Deep Learning and analytics solutions on POWER • Evaluate infrastructure efficiencies for enterprise AI
	**Chargeback Analysis** • Align chargeback policies to actual IT costs • Identify and overcome chargeback policies that drive adverse IT decisions
	**IT Best Practices Benchmarking** • Compare actual IT environment with best practices in the IT industry • Improve forecast and actual spend
	**Linux on POWER** • Assess x86 Linux workload requirements • Quantify technical and financial impacts of new workloads on Power Systems
	**SW Portfolio Analysis** • Review software currency and potential replacement with other products to optimize IT spend • Examine migration steps and services to ensure a successful transition

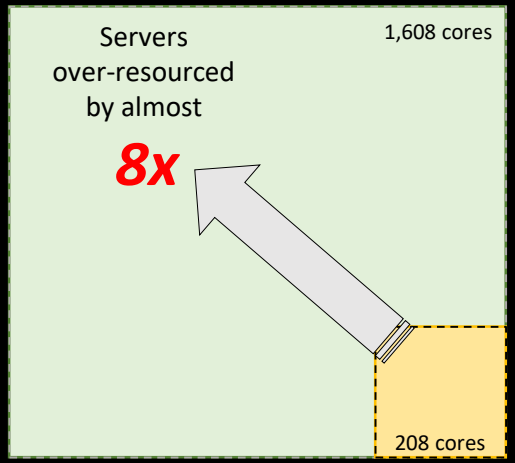
IT Economics studies are available at no-charge to IBM clients and Business Partners
Visit www.ibm.com/iteconomics or https://www.ibm.com/partnerworld/iteconomics

Contact the IBM IT Economics Team
IT.Economics@us.ibm.com

UTILIZATION Observed from a large US Insurance Company

Use Case:

Analysis of a large number of applications running in the data center of a large US insurance company:



Source: IBM, 2015.

Workloads ran on 41 virtualized servers with a total of 1,608 cores
(~25 VMs per server)

15% average utilization

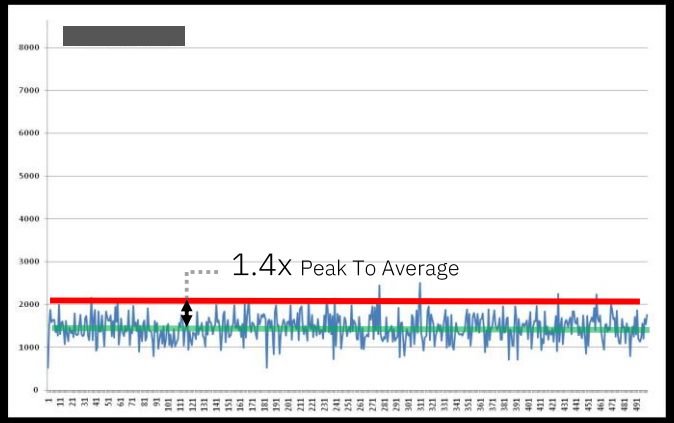
Capacity requirements analysis of the workloads showed they could have been **consolidated on 208 cores and run at 62% utilization**

Even when virtualized, x86 servers still often run at low utilizations

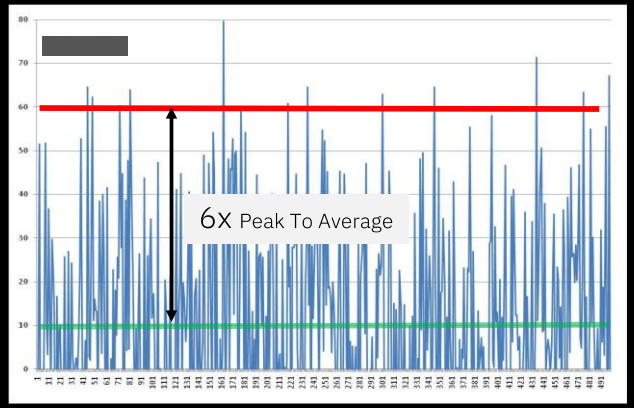
高密度整合 High Density Consolidation

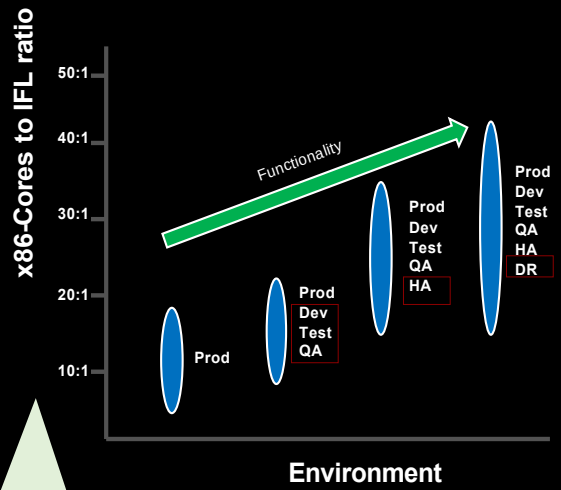
- 大幅降低軟體授權與維護費用

144 variable workloads



1 variable workload





X86 Intel cores to LinuxONE IFLs consolidation ratio
- Numbers taken from numerous IT Economics studies

以RED HAT OCP 舉例： When Intel : IFL=17 : 1, RED HAT OCP 軟體授權費用 US$4,000/2 Intel Cores and US$2,000/IFL

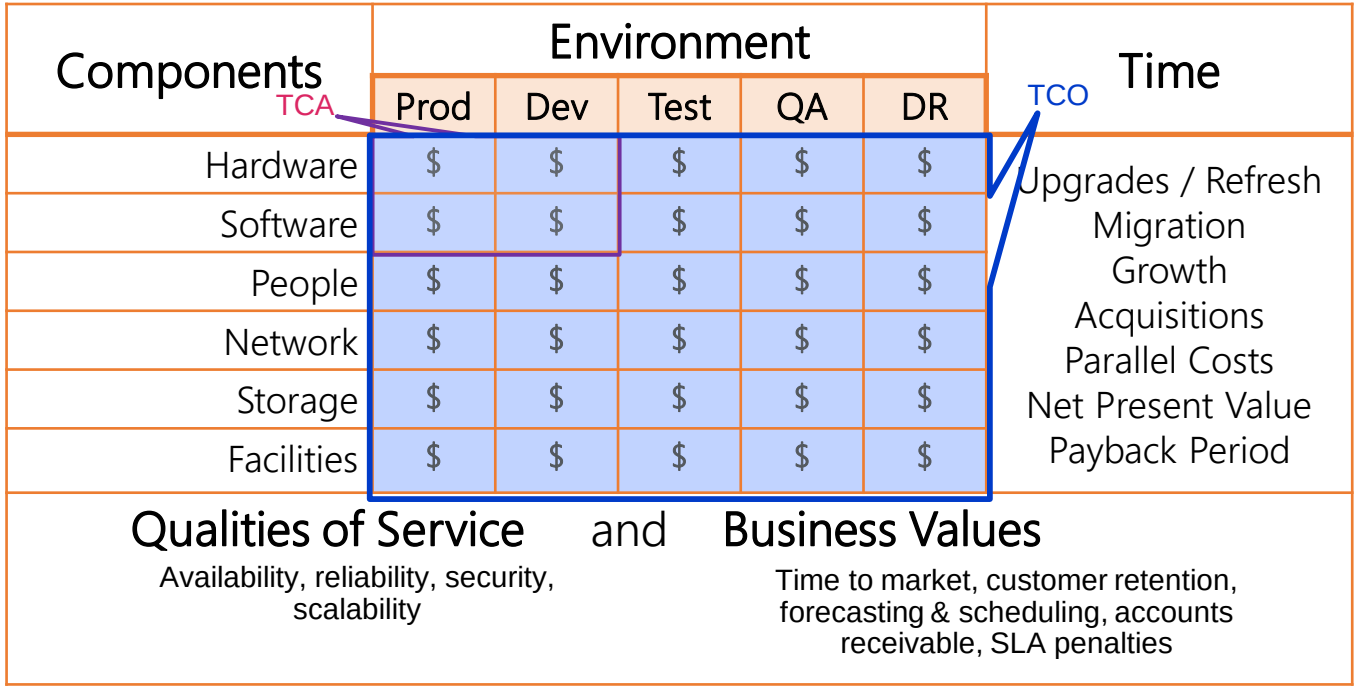
X86/Intel => (17/2) * US$4,000 = US$36,000

IBM LinuxONE=> 1*US$2,000 = US$2,000

IBM LinuxONE只要x86 **6%** 的軟體授權費用

Get the complete picture

An IT Economics assessment quantifies business values, technical requirements and costs



Total Cost of Ownership is much more than Total Cost of Acquisition!

Asian Airline moves its x86 workloads to LinuxONE

LinuxONE FIE Win

Client Situation

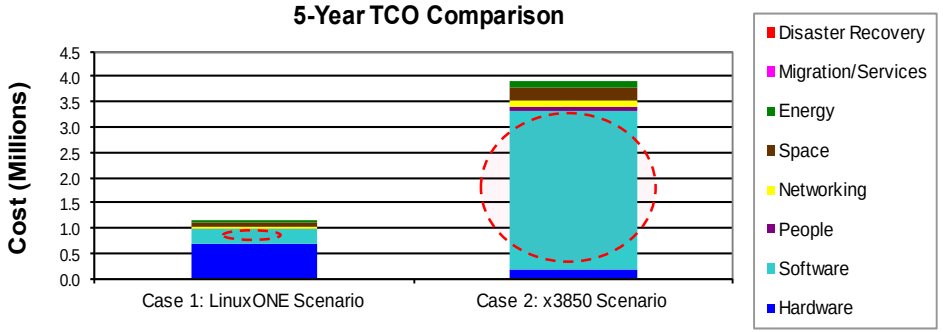
An Asian Airline was a long time x86 server user. It was looking for ways to efficiently manage its x86 infrastructure and was preparing to deploy a new set of Oracle workloads. The IBM account team engaged the IT Economics team to evaluate how the airlines' workloads could be consolidated onto a single LinuxONE server instead of deploying onto numerous x86 severs.

Our Solution

- Consolidate workloads onto LinuxONE to avoid sprawling server environment
- Leverage flexible, scalable platform with enterprise proven qualities of service while benefiting from open standards and cost advantages of Linux

Benefit to this client

- **$2.75M** savings over 5 years with LinuxONE compared to an x86 environment
- Simple management of one server resulting in less administration effort and reduced time to deployment
- Dramatic savings in SW licensing costs with fewer cores
- Reduction in Capex and Opex costs with ROI < 1 Year



- Server data based on customer specific actuals
- Pricing based on vendor published numbers
- Projections provided by IBM

source: IT.Economics@us.ibm.com

Consolidation : Scale-out Power consolidated to Enterprise Power E980

Client Situation

A French Government Agency wanted to address growth requirements and update its aging POWER7 and POWER8 scale out infrastructure while reducing cost of ownership.

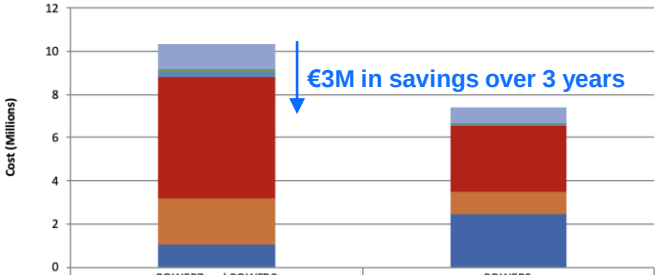
Our solution

- Consolidate workloads from existing Power Systems scale out servers to Power Enterprise E980 servers for improved capacity and denser workload placement
- Improves resource allocation with Enterprise Pool and decreases SW costs with higher core consolidation ratios for the agency's ISV products

Benefits for this client

- Technology refresh reduces required number **of database cores from 158 to 93, driving. a 40% savings in software support costs**
- Meets client's need to achieve a minimum 15% annual reduction in OPEX, and addresses 10% annual growth forecast over the next three years

Total Cost of Ownership Over 3 Years



	POWER7 and POWER8	POWER9
Electricity & Cooling	1,192,912	694,311
Datacenter Costs	98,800	46,800
Network	247,200	62,400
Midleware	5,640,000	3,090,000
Software Systems	2,113,656	1,050,624
HW OTC & HWMA	1,050,000	2,432,506

- Server data based on customer specific actuals
- Pricing based on vendor published numbers
- Projections provided by IBM

source: IT.Economics@us.ibm.com

Workload Placement: DB appliance v.s. IBM Power 9 v.s. x86

Client Situation

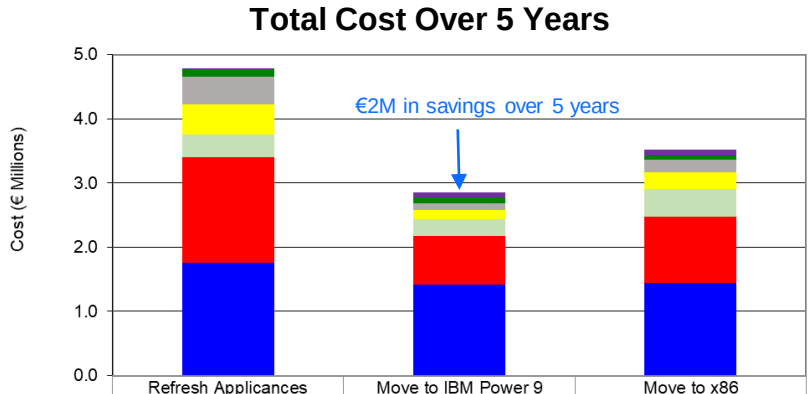
A European retailer had old database appliances with rising support costs that needed to be replaced. x86 was the proposed solution. POWER9 would be considered if it could provide cost savings.

Our solution

- Move all workloads from old appliances to IBM POWER9 to reduce software, hardware and support costs

Benefits for this client

- Move from a hard-to-support proprietary OS to an OS with support skills already on the payroll
- Lower 5 year TCO by around **€2M**
- Reduced data center and environmental costs
- Return on investment in 15 months



	Refresh Applicances	Move to IBM Power 9	Move to x86
Migration	€ 10,000	€ 90,000	€ 90,000
Energy	€ 105,470	€ 83,935	€ 67,014
Racking Space	€ 432,000	€ 112,000	€ 204,000
Networking	€ 480,000	€ 140,000	€ 255,000
FTEs	€ 350,000	€ 262,500	€ 437,500
Oracle DB S&S	€ 1,646,693	€ 748,497	€ 1,022,946
Hardware & Storage	€ 1,752,000	€ 1,421,996	€ 1,446,741

- Server data based on customer specific actuals
- Pricing based on vendor published numbers
- Projections provided by IBM

source: IT.Economics@us.ibm.com

Hybrid Cloud study

Perform a workload health check to find the right hybrid cloud solution

Examines workload size and activity, SLA and provisioning requirements, and instance costs to find the right cloud implementation with IBM Cloud Private

Compares existing environment to IBM and competitive cloud solutions

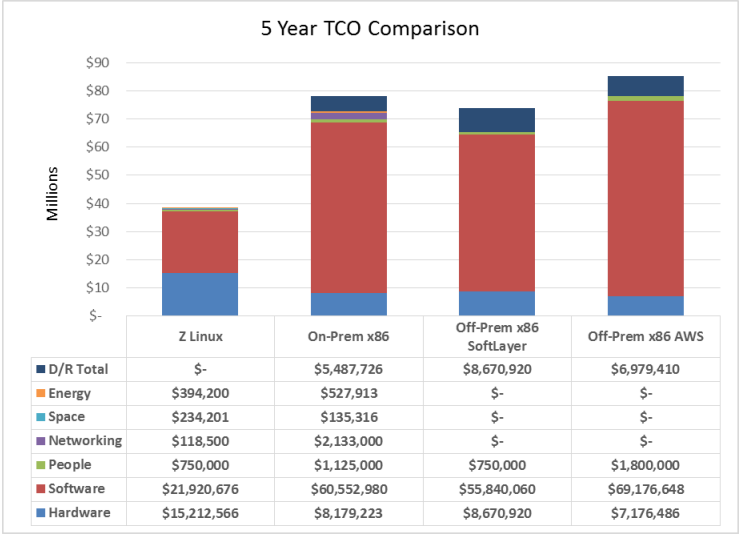
Offers options to integrate new workloads with existing Systems of Record in a hybrid model

Evaluates cloud server types for each workload (bare metal, single tenant virtual, multiple tenant virtual)

Determines most rapid and agile provisioning approach for new / changing business requirements

Examines TCO across four dimensions (cost components, workload environments, time to deploy traditional and ‘born on the cloud’ workloads, qualities of service) and provides ROI with Capex and Opex

IBM Z private cloud TCO versus public cloud solutions

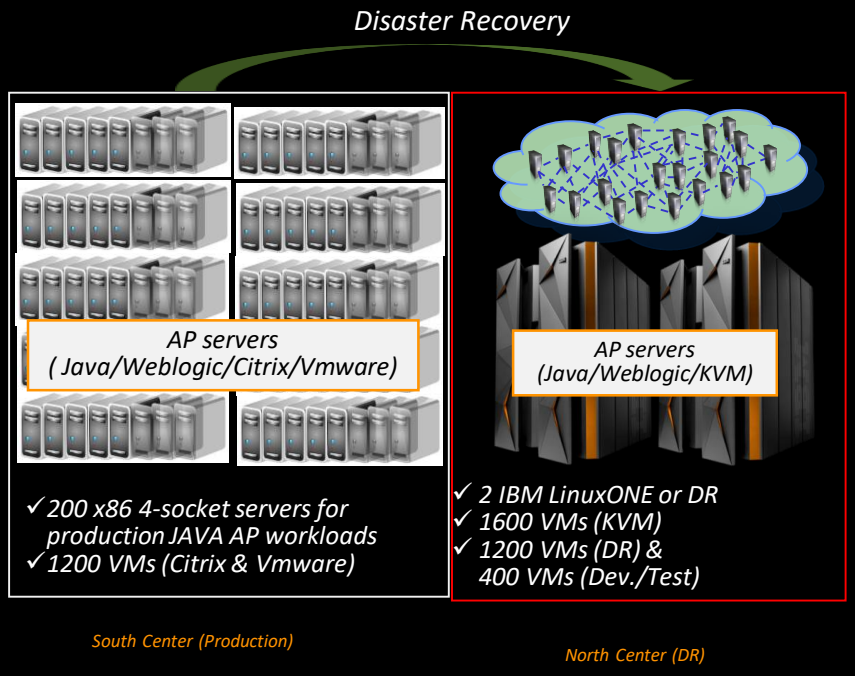


	Z Linux	On-Prem x86	Off-Prem x86 SoftLayer	Off-Prem x86 AWS
D/R Total	$-	$5,487,726	$8,670,920	$6,979,410
Energy	$394,200	$527,913	$-	$-
Space	$234,201	$135,316	$-	$-
Networking	$118,500	$2,133,000	$-	$-
People	$750,000	$1,125,000	$750,000	$1,800,000
Software	$21,920,676	$60,552,980	$55,840,060	$69,176,648
Hardware	$15,212,566	$8,179,223	$8,670,920	$7,176,486

Contact IT.Economics@us.ibm.com for a no-charge assessment

大幅降投資與營運成本，綠色機房最佳實踐

耗電量降低70%
佔地面積降低75%
軟件費用降低90%
符合節能坪效的
綠色機房要求



Phase I – DR

- ✓ *2 IBM LinuxONE Emperor II Servers (300 cores) to consolidation 200 x86 Servers (6,400 cores)*
- ✓ *KVM & Open Stack/Ansible*

Phase II – Production Replacement (1 province)

- ✓ *3 IBM LinuxONE Rockhopper II Servers (90 cores)*
- ✓ *Informix Database and Weblogic Application Servers*

Phase III – Production Replacement (more provinces)

- ✓ *10 IBM LinuxONE Emperor II Servers (1,380 cores)*
- ✓ *Informix Database and Weblogic Application Servers*

Phase IV – New Core Insurance Cloud

- ✓ *4 IBM LinuxONE Emperor II Servers (560 cores)*
- ✓ *Containerization & Tencent Cloud*

Phase V – Production Replacement (more provinces)

- ✓ *10 IBM LinuxONE Emperor II Servers (1,400 cores)*
- ✓ *Informix Database and Weblogic Application Servers*

The Met Office (英國氣象局) 利用 LinuxONE降低軟體成本

17 LinuxONE cores
now handle workload
that previously required
204 x86 cores

75%
reduction in Oracle
licensing costs

Major simplification
of the distributed server
landscape achieved

Met Office

The Met Office was using Oracle-based systems, mostly running on distributed Linux servers, to handle the post-processing of data from its weather supercomputer.
By consolidating all of these distributed database systems onto LinuxONE, Oracle licensing costs have been cut by approximately 75%.

"By consolidating distributed commodity servers, you can save a great deal of money."
— Martyn Catlow, portfolio lead for centralised IT infrastructure, the Met Office

Met Office

Business challenge

The Met Office has a mandate to deliver timely weather information to millions of customers across the UK. How could it ensure 24x7 availability for the systems that share weather data with customers?

"We can bet the business on LinuxONE—and I can sleep easily in the knowledge that we can absolutely rely on our data delivery systems."

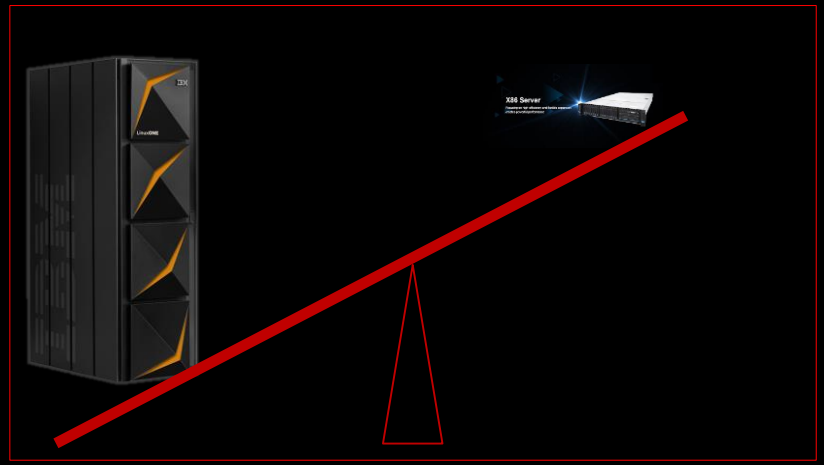
Graham Mallin, Executive Head of Technology, Met Office

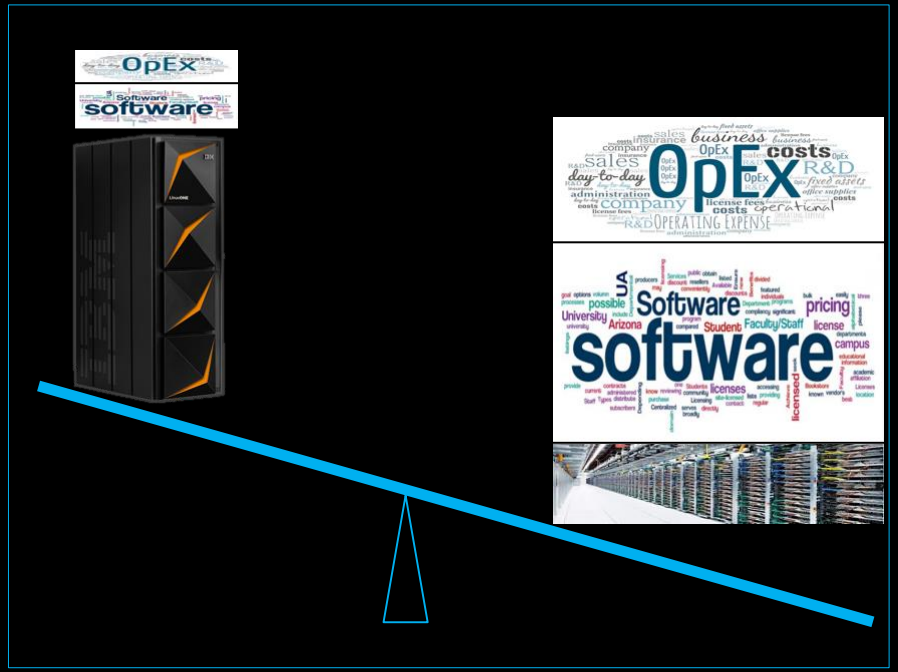
Business Benefits

- Consolidated their Oracle environment in 2014 – 15:1 consolidation ratio over x86
- Docker/Kubernetes on same platform.
- **50-60 PostgreSQL databases on same platform.**
- **MongoDB on same platform**
- Service Bus on same platform – 48:1 thread consolidation over x86

總體支出 (TCO)多或少？

貴或便宜 ？





優先順序評量...

– *降低軟體授權費用支出*

- Choose low utilization servers. Maximize software savings (focus on averages – not peaks)

– *提高生產效率與整體系統穩定性*

- Choose highest priority workloads with requirements for high availability and fast response time
- Focus on higher business value benefits versus investment

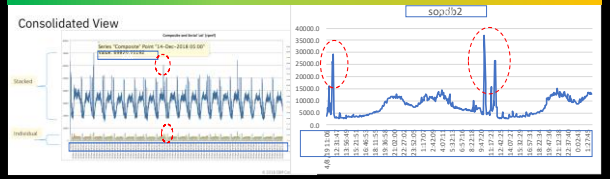
– *提升資安的要求與控制*

- Choose critical workloads which need higher quality of services. Include dev/test, backup, DR, etc.

製作一份專屬 貴企業的資訊總體持有成本分析報告
IT Economics TCO Study

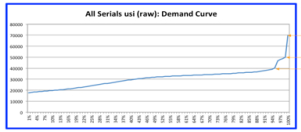
Data Collection

Crunch Analysis

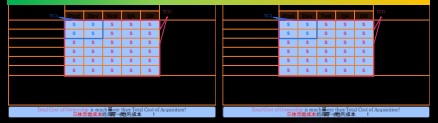


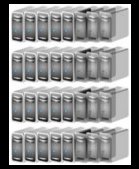
Sizing Assessment

Demand Curve Analysis – assessed through LinuxONE RH II

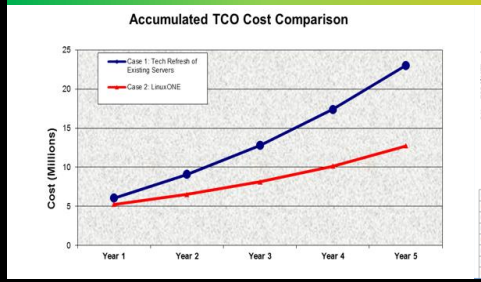


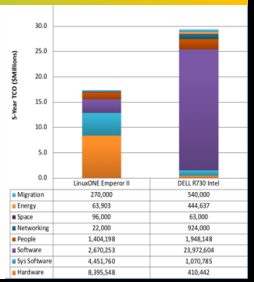
4-D Spending Calculation





5-Yr TCO Observation & Recommendation

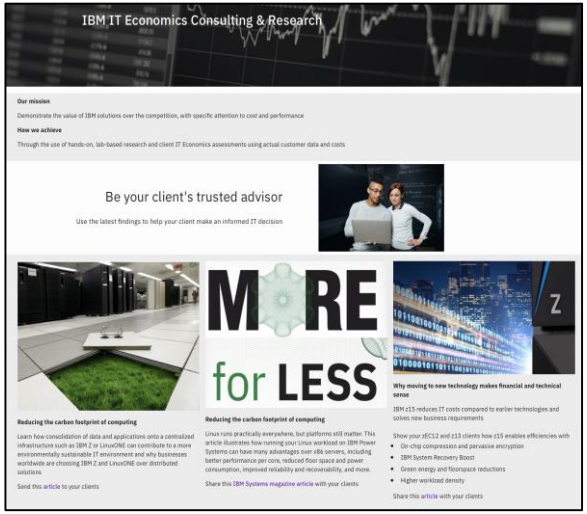




Find the latest on IT Economics

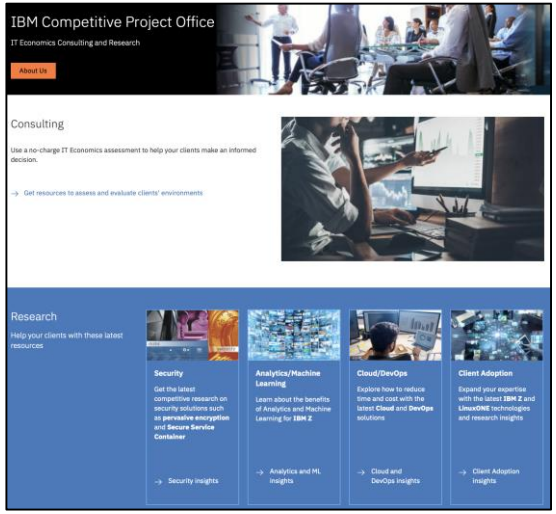
W3 for IBMers

http://w3.ibm.com/it-economics



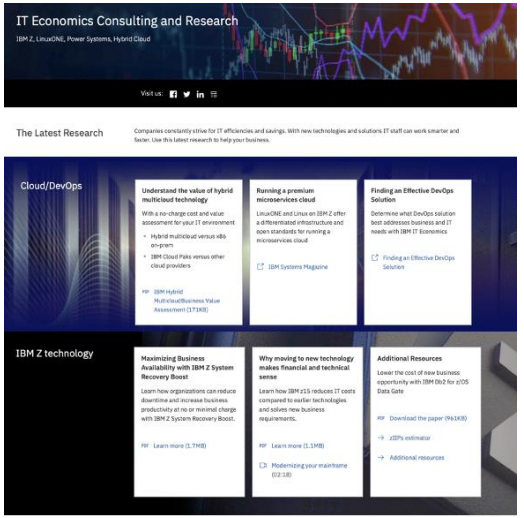
PartnerWorld for BPs

https://www.ibm.com/partnerworld/iteconomics



ibm.com for clients

www.ibm.icom/iteconomics



IBM Disclaimer

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice and at IBM's sole discretion.

Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision.

The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract.

The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Performance is based on measurements and projections using standard IBM benchmarks in a controlled environment.

The actual throughput or performance that any user will experience will vary depending upon many factors, including considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve results similar to those stated here.

All prices used are for study purposes only and cannot be construed as a binding quote. Actual prices are specific to each offering and may vary from those used in this study. IBM and its authorized Business Partners are independent entities and as such unilaterally establish their own prices and terms for Customers. Those prices and terms are confidential between IBM and the Customer and the Business Partner and the Customer, respectively.