

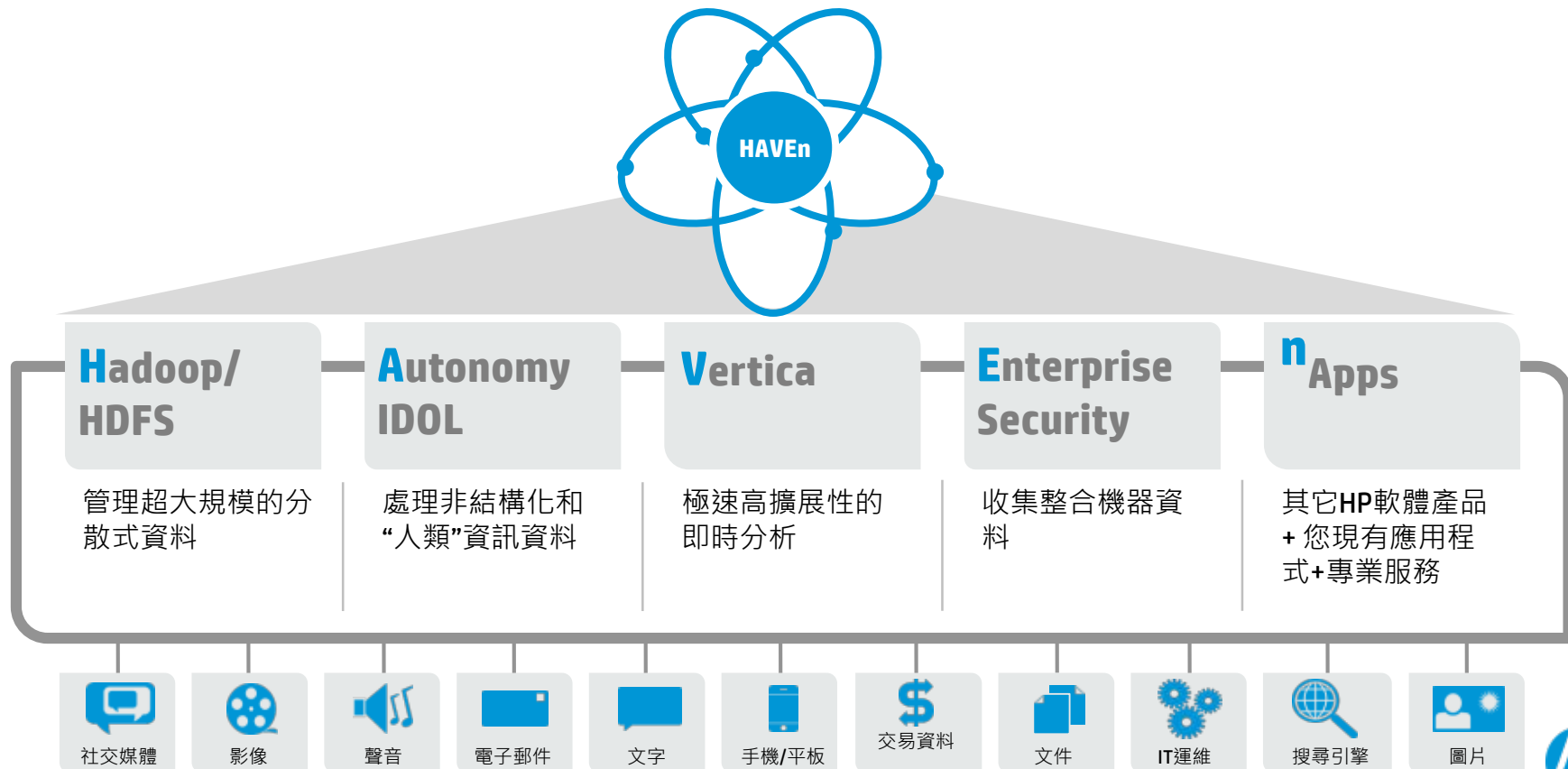


Big Data應用與實務

Jabar Liao

HP Software/Big Data Platform

HAVEen – HP大數據平臺



高科技產業案例簡介



UK based company

XXX uses a **HPC (high performance computing)** hardware cluster in its **chip manufacturing process**, and previously was using a **standard-rack Oracle** implementation to **monitor performance of their LSF (load sharing facility) and SAS front-end**. They also **analyze test data from their rigs used in prototype chip testing**. In both use cases, they needed more speed and query performance. They realized that trying to analyze data with their 20th century Oracle technology was quite limited, especially given the massive quantities of data output in the testing process.

- Couldn't monitor HPC cluster load balancing: The Oracle database was too slow for monitoring the Platform LSF and SAS performance.
- Couldn't query test data effectively: Query performance and data loading was far too slow for the customer's needs.

For more on the first use case, check out the diagrams at the following link:

https://support.sas.com/rnd/scalability/platform/PSS7.1/arm_instrumentation.pdf

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為何選擇 HP Vertica? (V)

- Vertica 的效能無與倫比 (列儲存與列運算, columnar)
- Vertica 可以與 SAS整合, 不須修改程式跟流程 (SAS內建driver)
- Vertica 能夠一邊裝載資料並同時運算, 不用等待索引更新 (Vertica 獨家技術)

Vertica可以即時裝載資料, 並同時執行分析, 使整體系統效能從資料裝載到結果產出

比原來的Oracle快了 **1000** 倍 !!



Kokubu



HP Vertica improves analysis performance by up to nine times

Challenge

- Renovate its integrated data warehouse environment, creating faster access to sales data

Solution

- HP Vertica Analytics Platform

Results

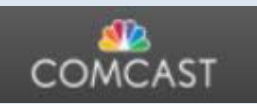
- Enhanced analysis performance on 1,100,000,000 items of detailed transaction data by up to nine times
- Shortened loading times for daily merchandise report data using batch processing from 2.5 hours to 17 minutes
- Delivered a system with low administration cost, using the HP Vertica projection function rather than requiring an index
- Reduced the wait times for data analysis results, improving work efficiency



電信產業案例簡介



HP Vertica電信產業案例

客戶	使用場景
	AT&T實驗室用HP Vertica作為其6天內通話記錄分析平臺，包括CDR數據、IP統計等。每天12TB的數據，保存6天，總共70TB左右的數據量
	Comcast使用Vertica作為其網路性能資料分析平臺和VOD使用分析平臺，分析整個各種網路流量資料和視頻點播資料。Vertica使客戶能夠快速定位和緩存熱點資料，提高客戶滿意度，為Comcast節省了3億美金。壓縮比10倍，性能提升10倍，資料量40TB
	Level3使用Vertica來分析CDR和網路錯誤日誌，以達到快速優化網路品質的目的
	Optus使用Vertica作為分析平臺支持Optus所有後付費和預付費用戶可查看到話費使用情況，包括語音、資料和漫遊。一些漫遊資料的查詢由原來7-8小時減少到幾分鐘。數據量200TB
	Sprint, 網路性能監控與分析平臺，每5,10,15分鐘採集網路資料，替換Oracle
	Empirix, ASDR（應用服務細節記錄分析）平臺，使操作員能快速回應客戶的網路投訴，定位問題。比之前MySQL資料庫性能提升3倍。
	tw telecom, 有線網路容量與性能分析平臺，35TB數據量
	Verizon, 網路安全與威脅資料分析平臺，32節點的Vertica資料庫，840億的網路流量資料查詢只需要10秒，670億的DNS日分析只需要2分半
	nMetrics 網路性能分析平臺，替換原有PostgreSQL，性能提升100x - 1000x倍，由原來上百秒的查詢減少到幾秒甚至不到一秒



中國電信CDMA流量分析 (V)

> 業務挑戰

- 每天上千個檔需要入庫，每5到10分鐘一個500GB的檔，15億條記錄
- 當前的Oracle + Informatica每天需要 16小時載入，12小時匯總，資料分析幾乎無法完成
- 日間存儲的壓力和歷史資料的存儲壓力都非常大

> VERTICA解決方案

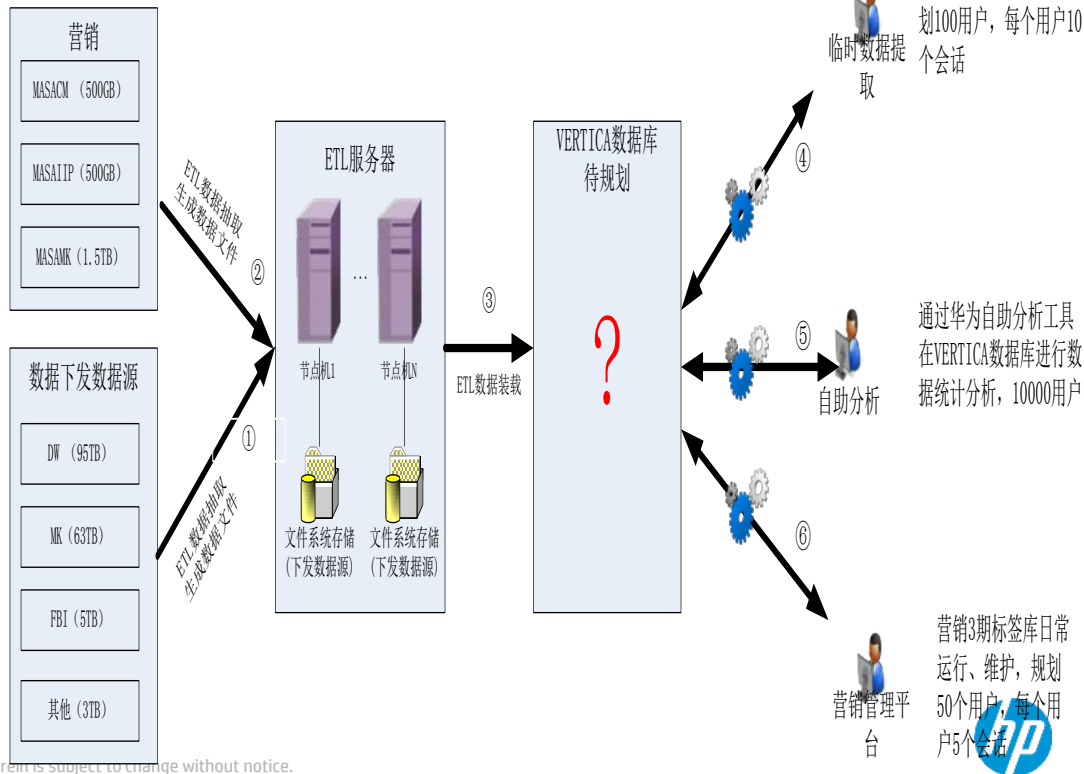
- 1個ETL伺服器 + 2個千兆乙太網連接的Vertica節點
- 即時將原始檔案FTP到 ETL 服務器，在ETL伺服器上保留3個月
- 10多個執行緒並行即時載入，達到**300k條/秒**，而原系統平均為5k條/秒
- 資料匯總2小時內完成
- 資料壓縮比8x
- 智能定時作業
- 通用的x86硬體設定

> 優勢

- 性能大幅提升
 - **60倍**的資料載入速度
 - **12倍**的資料匯總
- 存儲優化
 - **8倍**壓縮比，大幅節省存儲空間
- 即時載入與分析
 - 即時載入與資料分析同步進行
- 優異的擴展性
 - 隨時添加節點
 - 動態資料再平衡

河南移動資料自助服務與行銷分析

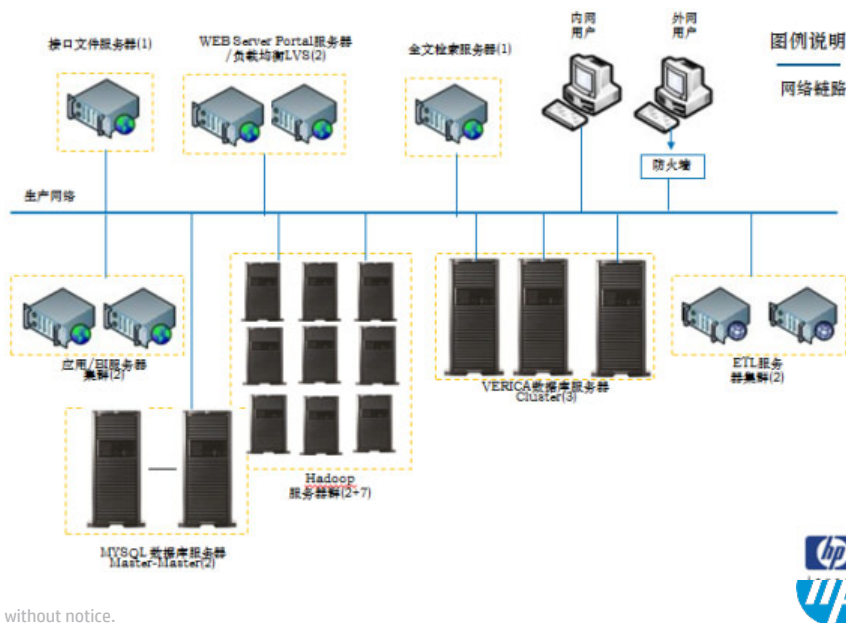
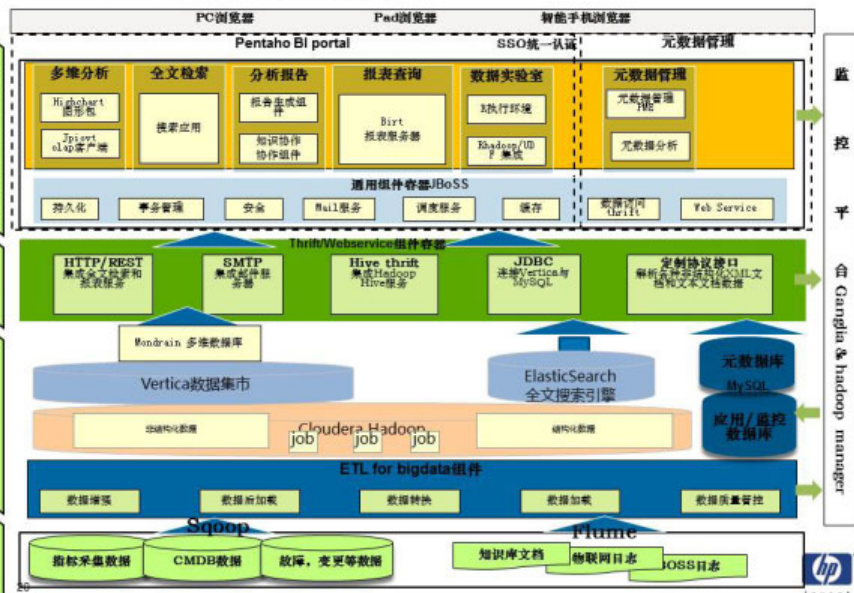
- 原有的資料倉庫無法滿足日益增長的資料自助服務和行銷分析的需求
 - 有10000個業務使用者需要即時使用資料分析
- 資料自助服務：
 - 由業務使用者自己通過自助分析工具進行資料統計分析
 - 使用者通過資料庫開發工具編寫腳本完成臨時資料提取
- 行銷大資料分析：
 - 各種行銷模式和促銷手段的大資料分析
 - 客戶屬性資料的關聯分析，包括客戶畫像查詢、標籤客戶群刷新、標籤分析的資料刷新
- 32節點，資料量360TB



深圳移動全網智能監控平臺

- 全網級別監控資料進行深層次分析的智慧分析平臺，為集團、公司內部和省公司提供資料分析服務
- 需求：能夠低成本擴展已存儲高速增長的資料規模；能夠處理更多地非結構化資料，如web日誌以及物聯網的應用日誌；能夠在大規模資料下進行深度資料採擷，超越傳統的隨機採樣分析的方法，而代之以全數據級別的分析能力
- 200GB/天，20TB

智能分析平台总体技术架构图



Internet產業案例簡介



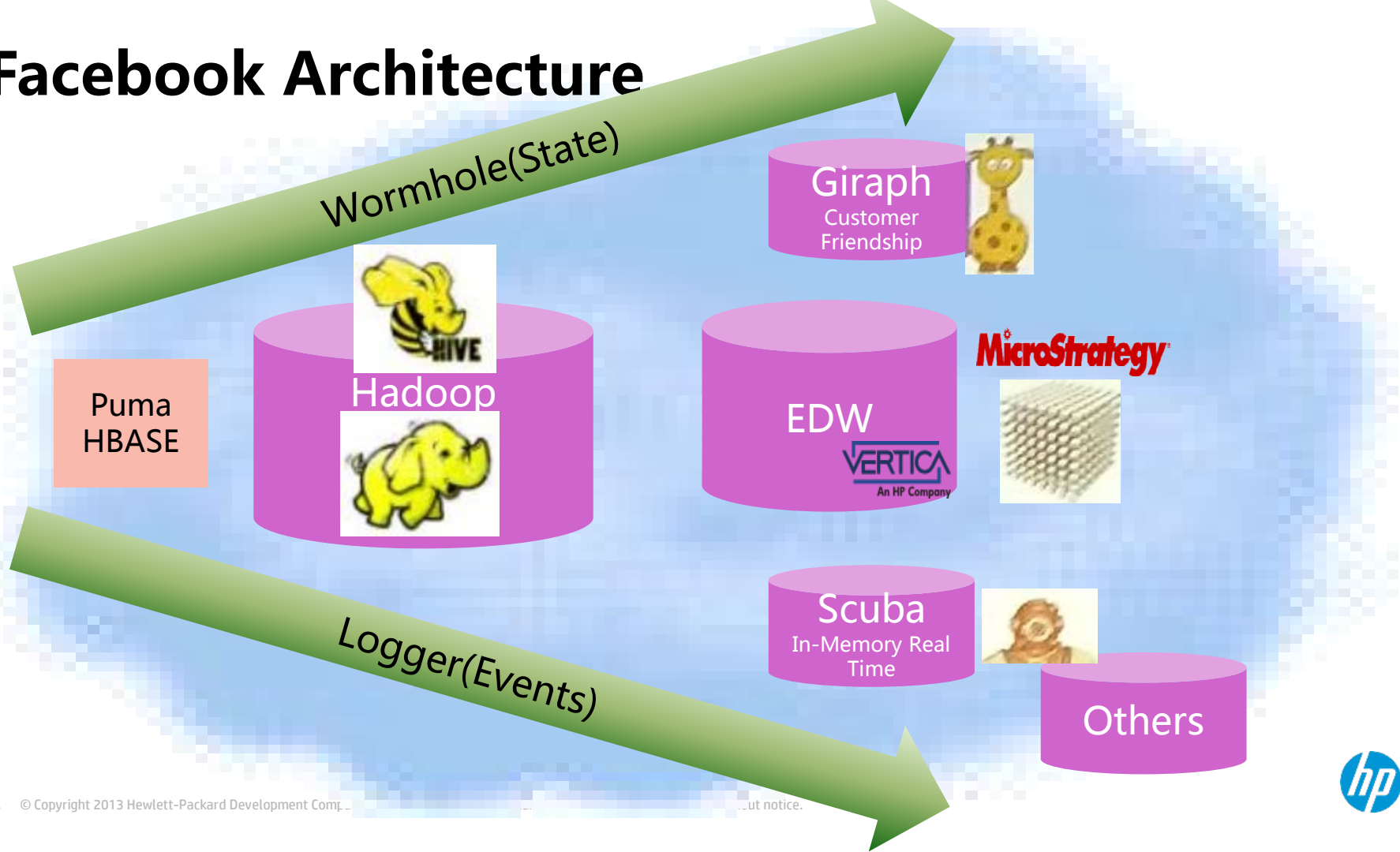
為什麼選擇MPP



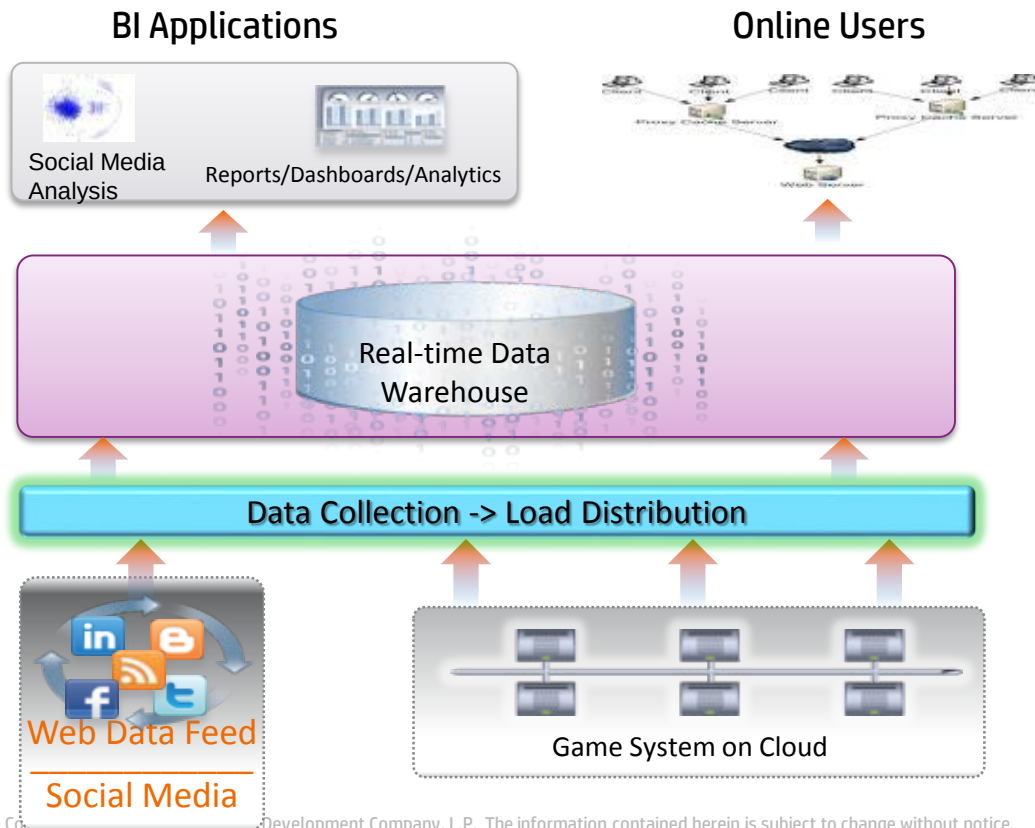
- 日益增長的分析需求
- Map/Reduce(Hive)太慢，而且大多數分析需求安全性無法保證
- In-memory技術太貴而且不成熟
- 傳統行式DW數據庫的先天缺陷
 - 在數據量較小時速度還行，但當數據量到達超大規模時（比如100TB以上），性能急劇下降
 - 擴展性受限
 - 成本高昂
- 需要一個大型的MPP資料庫
 - 有更多分析的功能
 - 能快速有效的處理大規模的數據
 - 能保證資料安全
 - 能提供系統的穩定性
 - 能夠通過深度分析資料來提升收入、產生新產品（這些在現有平台無法實現）



Facebook Architecture



線上遊戲 (H+V)



- 5 —> 25 —> 115 —> **230** 節點集群
線上擴展
- **3 PB** 資料，每天新增**10T**資料，新增資料要求**1分鐘**以內可用於分析
- **4千萬**在線使用者訪問資料
- 從海量資料中即時識別個人需求和潛在的購買需求
- 實時分析社交關係去吸引一個新的客戶





Mobile gaming company leads with creativity supported by data

Challenge

- Adopt real-time gaming data analytics platform

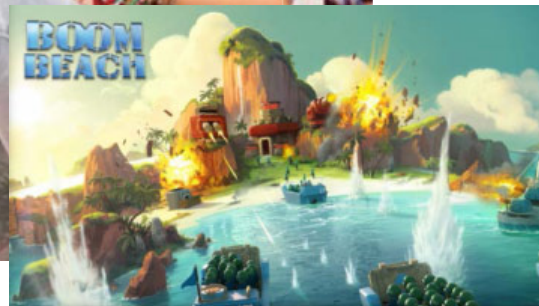
Solution

- HP Vertica Analytics Platform

Results

- Queries reduced from two to four hours to minutes or seconds
- Solution successfully met cloud deployment requirement
- Expanded data capacity from a few months to whole life time of data
- Analytics improved customer service by augmenting player support

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Entertainment - gaming



Challenge

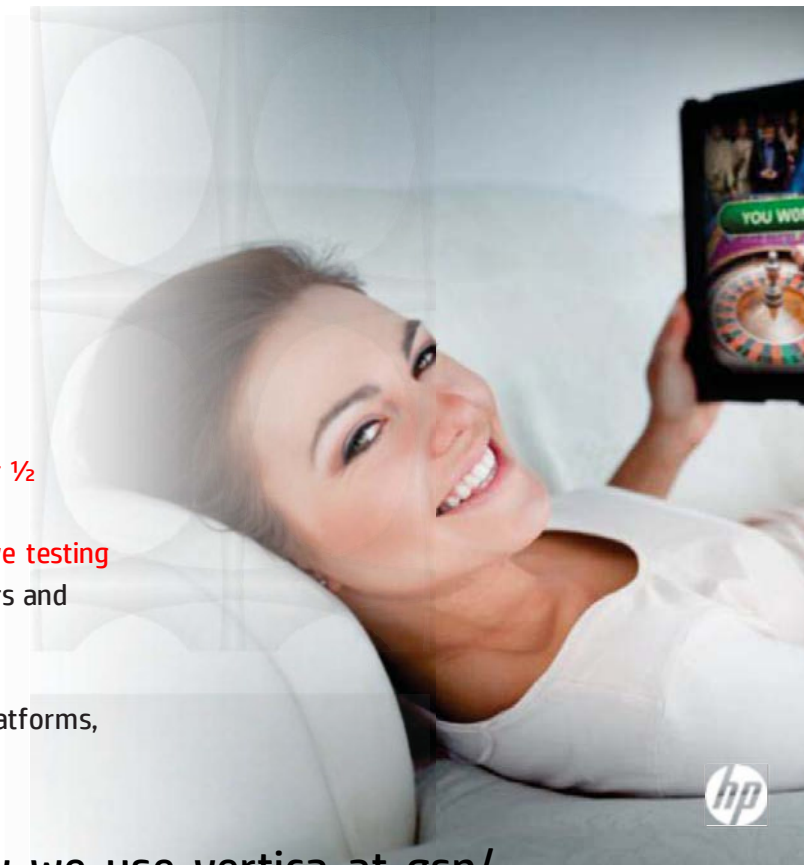
- Rapid data analysis to power strategic growth

Solution

- HP Vertica Analytics Platform

Results

- **Reduced A/B test time from up to 36 hours to under 1/2 second; analyze trillions of data points in real time**
- **Improved game development through rapid, iterative testing**
- Insights into whether new features will engage users and monetize well
- Increase user engagement and re-engagement
- Improved visibility into ad spend across different platforms, from Facebook to mobile



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<http://willsllc.github.io/blog/how-we-use-vertica-at-gsn/>



Spil Games



Captures big data prize with HP Vertica

Challenge

- Capture and leverage enormous volumes of website data to enable both real-time website adaptability and improved business insights and decision making

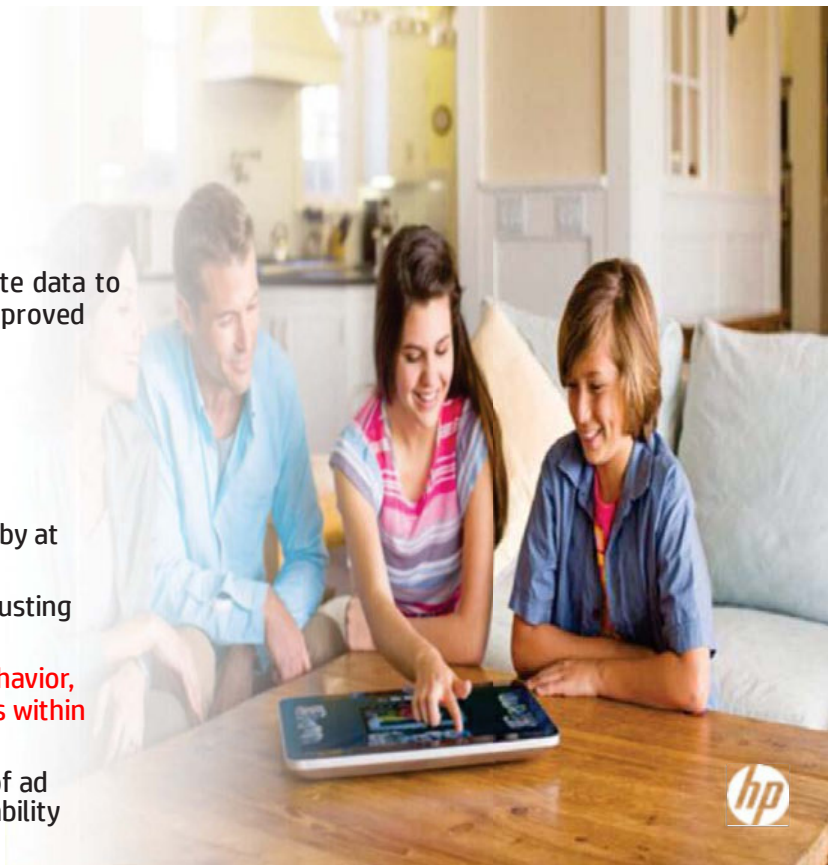
Solution

- HP Vertica Analytics Platform

Results

- Queries faster than previous open source solution by at least two orders of magnitude
- Websites adapt dynamically to visitor behavior, adjusting content within 12.5 minutes based on visitor clicks
- **Business can respond more nimbly to customer behavior, enhancing products and then observing the effects within 15 minutes of user activity**
- **Improved insight into site visitors improves value of ad placement, which in turn drives revenue and profitability**

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醫療產業案例簡介



MZI HealthCare

Improves patient health with HP Vertica in the cloud

Challenge

- Improve patient care and safety with advanced analytics performance on the cloud

Solution

- HP Vertica Analytics Platform

Results

- Performance increases of 100x over legacy systems—data loading reduced from days to hours and hours to minutes
- Equips healthcare organizations with the analytics required to meet today's new clinical, financial, and performance requirements
- Empowers users by tracking more than 500 healthcare quality measures, while integrating disease registries
- Deliver data for analysis and reporting immediately after loading, instead of in hours or days
- Provides a cloud-based platform capable of delivering real-time analytics at an affordable price point



Cerner Corporation



HP Vertica helps to optimize health information solutions

Challenge

- Improve efficiency and quality of patient care by improving the productivity of clinician users

Solution

- *Cerner Millennium* health care platform
- HP HAVEn engines: HP Vertica Analytics Platform, Hadoop

Results

- 6,000% faster analysis of timers helps Cerner gain insight into how physicians and other users use Millennium and make suggestions about using it more efficiently so the users become more efficient physicians
- Rapid analysis of 2 million alerts daily enables Cerner to know what will happen, then head off problems before they happen



BIG Data 與IT營運及資訊安全





HP IT

惠普業務

1200億美金的銷售額

全球最大IT公司

管理超過10億的產品

全球超過30萬員工

運營在170 個國家

超過650個運營點

500多個業務流程



龐大的 IT 基礎設施 處理海量資訊

1,500+

企業級路由器

4PB

日資料傳輸量

50億

日安全事件

900億月安全事件

15,000+

網路switch

63 PB

部署在3Par, XP 和 EVA
上的容量

442,000

個人電腦被部署

41,000+

伺服器

150,000+

移動設備

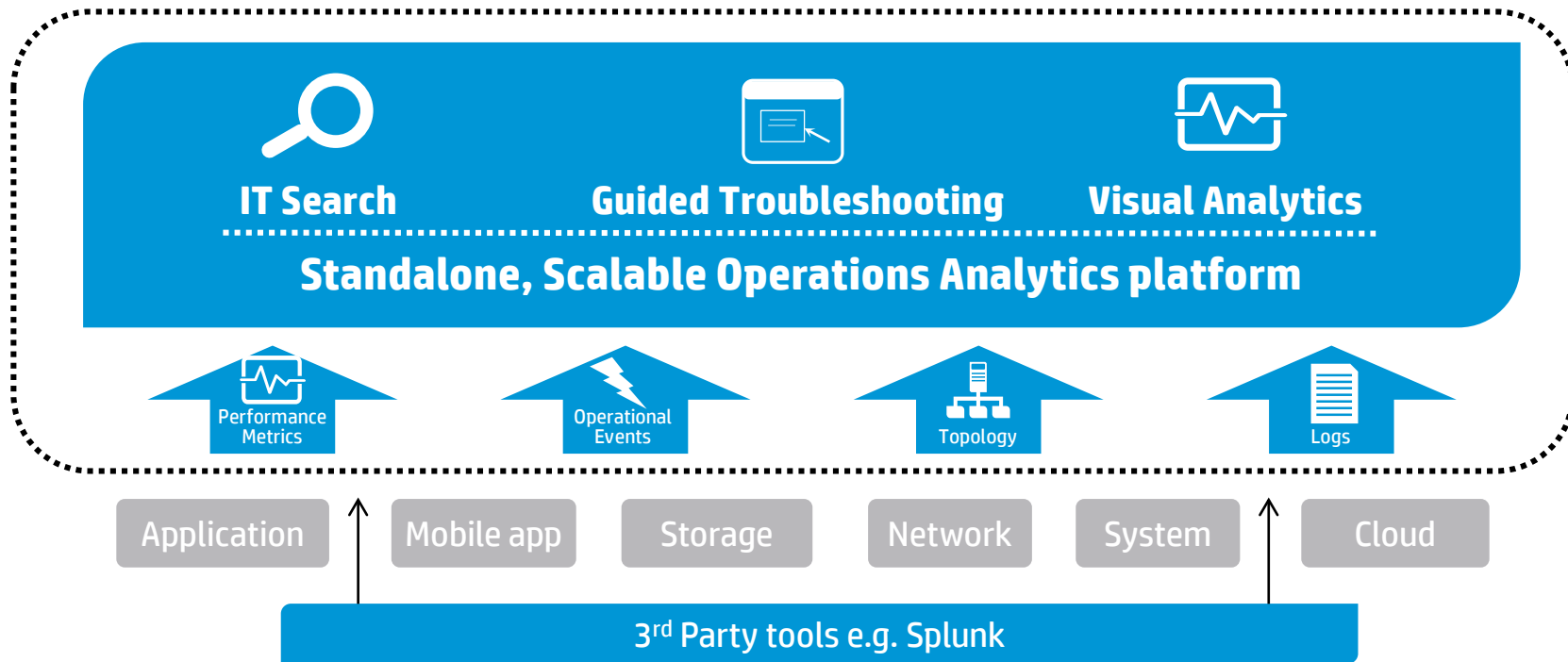
450,000

郵箱被管理

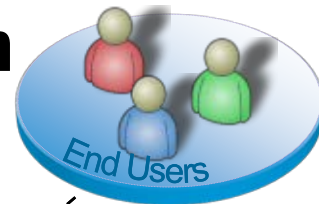


HP IT維運資料分析BIG DATA解決方案-基於HAVEn (V+E)

Comprehensive, actionable insight into all aspects of operations for the New Style of IT



OpsA (Operation Analytics) 系統架構 - 基於HAVEN



PQL
AQL

End Users

VMs

OpsAnalytics App Server Virtual Appliance

OpsA AS JVM

EJB Container

Collect Admin

Web Container

UI

Docs

Analytics Engine

Data Access Layer

Vertica JDBC

Logger JAX-WS

OpsAnalytics Collector
Virtual Appliance (CentOS)

OpsA Collector JVM

OpsAnalytics Collector

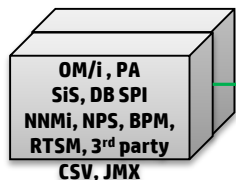
Data Access Layers

WS

Vertica JDBC

Admin

Metrics Data



Metrics
Structured Logs

Structured Data
• metrics
• structured logs

Structured Data

Raw Logs
(responses to Logger native queries)

PQL - Phrased Query Language
AQL - Analytics Query Language

Structured Data Flow
Unstructured Data Flow



PQL, AQL

- PQL = Phrase Query Language, close to natural language search
 - Used in Guided Troubleshooting
 - Searches through all data including logs, metrics, events, topology
 - For improved search capability, relies on tagging of data
 - Built-in tags for HP collectors, such as OM, OMi, BPM, NNMi, SiteScope

```
CPU utilization host "exchange*.hp.com"
```

- AQL = Analytics Query Language, advanced query language with built-in analytics verbs and functions
 - Used to generate visualizations, graphics
 - Combines searches into structured and unstructured data

```
from i in (oa_sysperf_global)
where i.host like "bill.fc.hp.com"
let analytic_window = between($starttime, $endtime)
let interval = 3600
select moving_avg(i.cpu_util)
```



BankingApp

Custom Time

Review

Edit Search Apps

03 June 2013 08:16:02 - 03 June 2013 10:16:02

09 PM

Mon 03

03 AM

06 AM

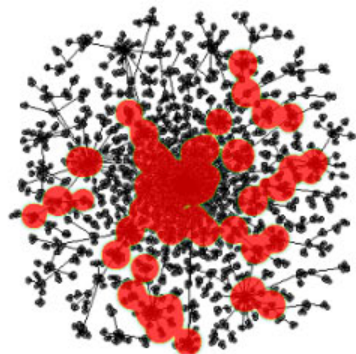
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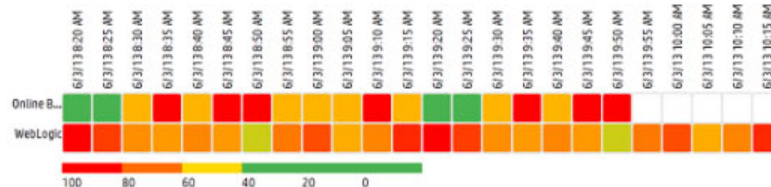
Hot Data View



Service Status



Mobile Banking App Heat Map



Showing page 1 out of 1 pages

← Previous Next →

SiteScope jdbc advantage

obaapp1 - MaxCapacity ()



obaapp1 - WaitingForConnectionHighCount 0

Errors and Configuration Changes

Showing 1 to 409 of 409 entries (filtered from 410 total entries)

Filter:

TimeStamp	Message
03 June 2013 12:36:30	#### <[ACTIVE] ExecuteThread: '41' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977819067>
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03 June 2013 12:31:27	#### <[ACTIVE] ExecuteThread: '32' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977788700>
03 June 2013 12:28:56	#### <[ACTIVE] ExecuteThread: '60' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977773625>
03 June 2013 12:26:25	#### <[ACTIVE] ExecuteThread: '58' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977758544>
03 June 2013 12:23:54	#### <[ACTIVE] ExecuteThread: '51' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977743466>
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BankingApp Custom Time

Review

Edit Search Apps

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09 PM

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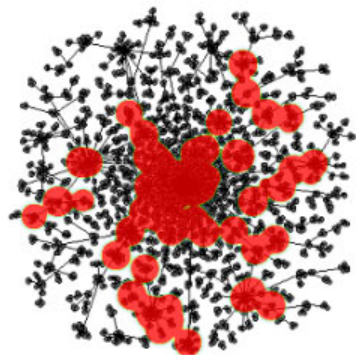
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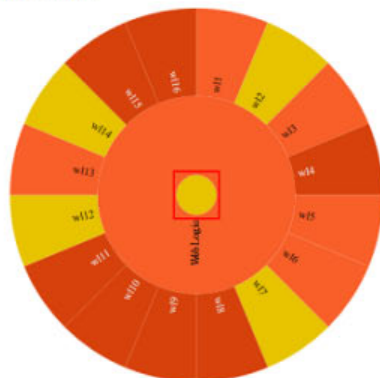
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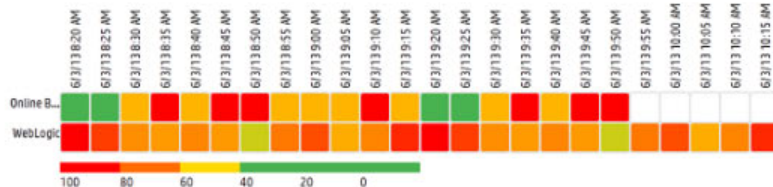
Hot Data View



Service Status



Mobile Banking App Heat Map



Showing page 1 out of 1 pages

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SiteScope jdbc advantage

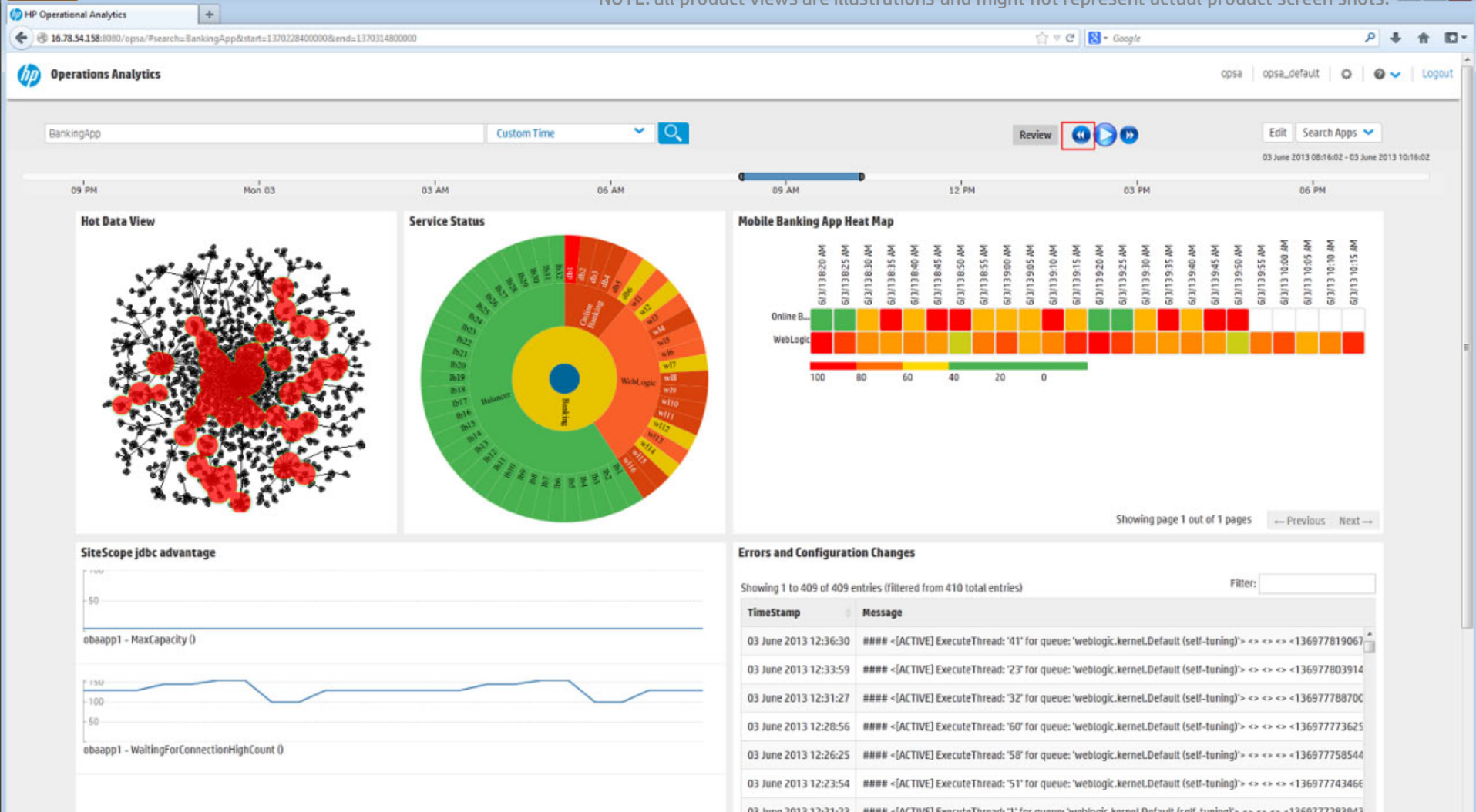


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BankingApp

Custom Time

Review

Edit

Search Apps

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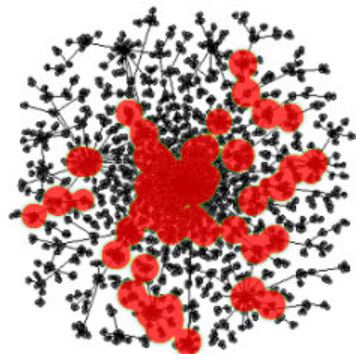
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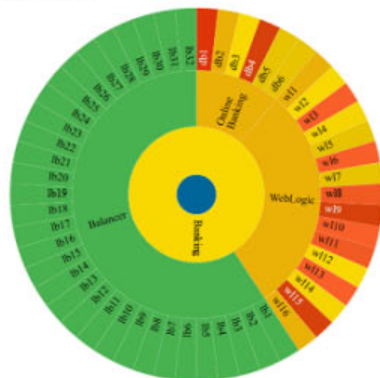
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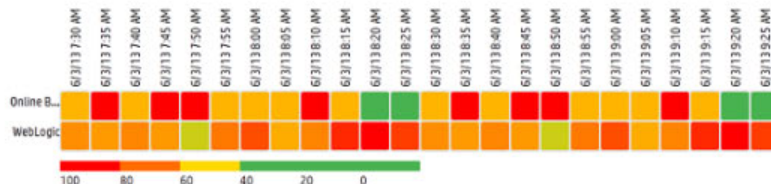
Hot Data View



Service Status



Mobile Banking App Heat Map



Showing page 1 out of 1 pages

Previous Next

SiteScope jdbc advantage



Errors and Configuration Changes

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BankingApp

Custom Time

Review

Edit

Search Apps

03 June 2013 06:06:02 - 03 June 2013 08:06:02

09 PM

Mon 03

03 AM

06 AM

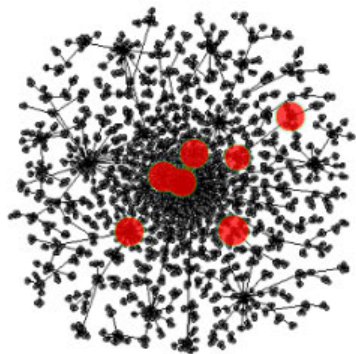
09 AM

12 PM

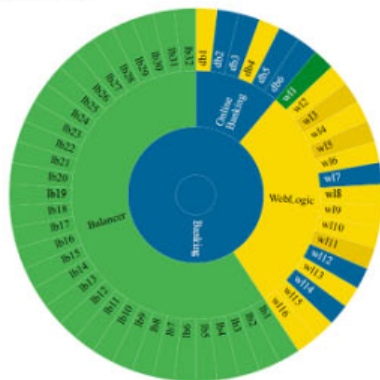
03 PM

06 PM

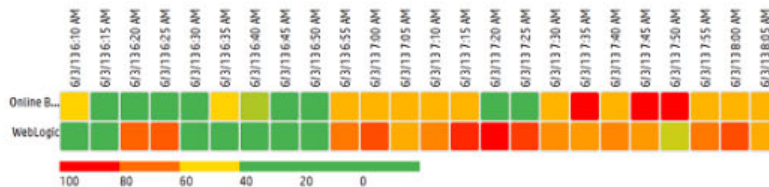
Hot Data View



Service Status



Mobile Banking App Heat Map



Showing page 1 out of 1 pages

Previous Next

SiteScope jdbc advantage



Errors and Configuration Changes

Showing 1 to 409 of 409 entries (filtered from 410 total entries)

Filter:

TimeStamp	Message
03 June 2013 12:36:30	#### <[ACTIVE] ExecuteThread: '41' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977819067
03 June 2013 12:33:59	#### <[ACTIVE] ExecuteThread: '23' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977803914
03 June 2013 12:31:27	#### <[ACTIVE] ExecuteThread: '32' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977788700
03 June 2013 12:28:56	#### <[ACTIVE] ExecuteThread: '60' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977773625
03 June 2013 12:26:25	#### <[ACTIVE] ExecuteThread: '58' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977758544
03 June 2013 12:23:54	#### <[ACTIVE] ExecuteThread: '51' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977743466
03 June 2013 12:21:23	#### <[ACTIVE] ExecuteThread: '11' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <> <136977738343

BankingApp

Custom Time



Review



Edit

Search Apps 

03 June 2013 04:36:02 - 03 June 2013 06:36:02

09 PM

Mon 03

03 AM

06 AM

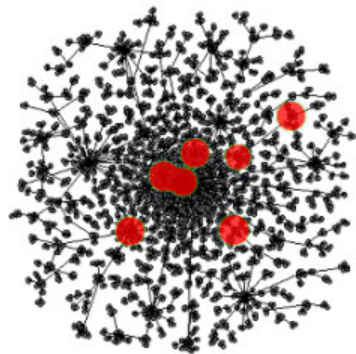
09 AM

12 PM

03 PM

06 PM

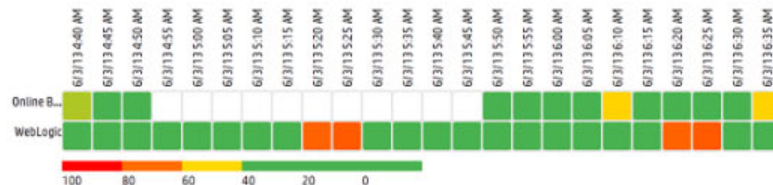
Hot Data View



Service Status



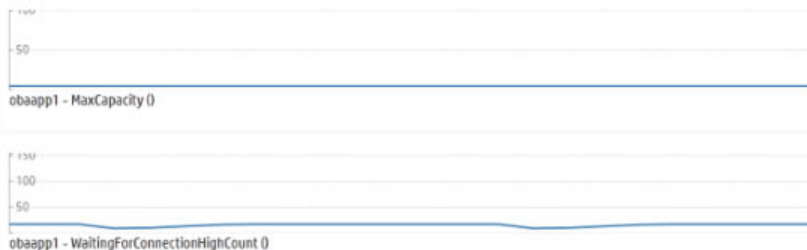
Mobile Banking App Heat Map



Showing page 1 out of 1 pages

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SiteScope jdbc advantage

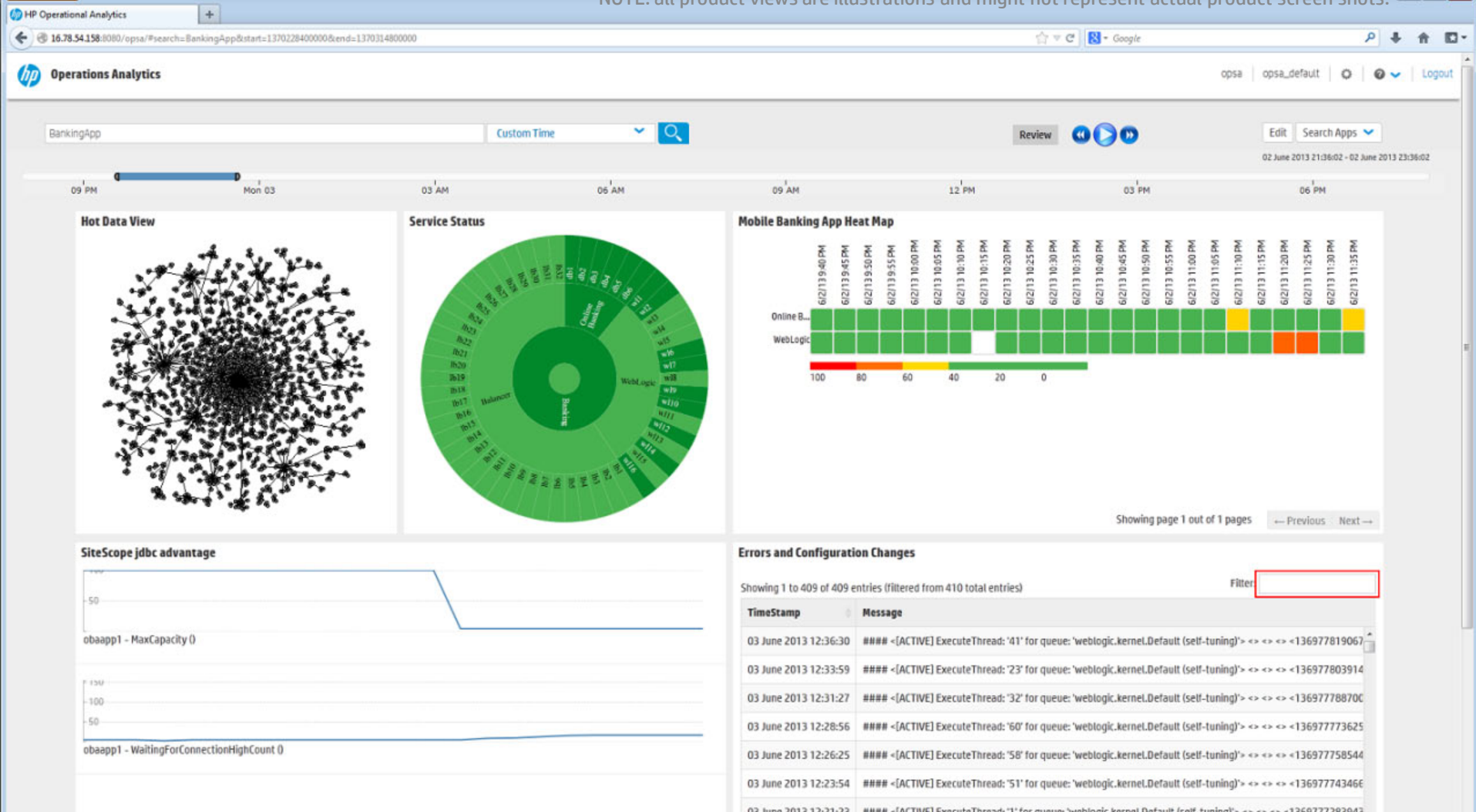


Errors and Configuration Changes

Showing 1 to 409 of 409 entries (filtered from 410 total entries)

Filter:

TimeStamp	Message
03 June 2013 12:36:30	#### <[ACTIVE] ExecuteThread: '41' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <136977819067>
03 June 2013 12:33:59	#### <[ACTIVE] ExecuteThread: '23' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <136977803914>
03 June 2013 12:31:27	#### <[ACTIVE] ExecuteThread: '32' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <136977788700>
03 June 2013 12:28:56	#### <[ACTIVE] ExecuteThread: '60' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <136977773625>
03 June 2013 12:26:25	#### <[ACTIVE] ExecuteThread: '58' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <136977758544>
03 June 2013 12:23:54	#### <[ACTIVE] ExecuteThread: '51' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <136977743466>
03 June 2013 12:21:22	#### <[ACTIVE] ExecuteThread: '11' for queue: 'weblogic.kernel.Default (self-tuning)'> <> <> <136977728204>



Custom Time



Search Apps

02 June 2013 21:36:02 - 02 June 2013 23:36:02

09 PM Mon 03

03 AM

06 AM

09 AM

12 PM

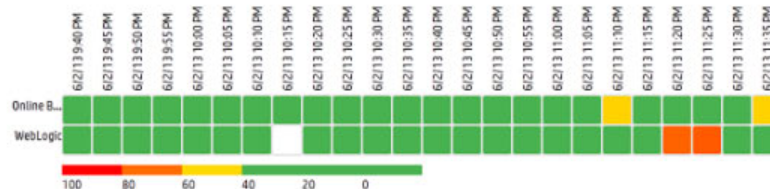
03 PM

06 PM

Service Status



Mobile Banking App Heat Map



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SiteScope jdbc advantage



Errors and Configuration Changes

Showing 1 to 1 of 1 entries (filtered from 410 total entries)

Filter:

TimeStamp	Message
02 June 2013 10:47:59	[Audit log] jdbc connection pool size changed from 100 to 5 by user georgek

Machine Data for Warranty Impact

HP IT



Challenge at HP IT

- Current data warehouses could not provide iterative or predictive analytics in a timely, cost-effective manner
- HP Gen8 servers call-out feature provide telemetry data 24x7, generating massive amounts of data
- HP would like to be proactive about notifying server customers before a warranty event, increasing satisfaction and reducing support costs

HP Vertica Solution

- Speed and compression allow HP to load and query on the massive amounts of telemetry data provided by Gen8 servers
- Discovered a memory change followed quickly by a processor change leads to a warranty event 24.5% of the time – HP was proactive with customers to fix issues before problems
- Determined for **every 1% improvement in quality** for their servers provides **\$4.5 million in potential benefit for HP**



Analyzing Billions of Clicks

www.HP.com



Challenge at HP.com

- Millions of visitors generate 11 – 12 billion clicks per month
- Must store 5 years worth of data to get full value of year-over-year clickstream analysis
- Oracle database had sluggish performance – queries took 48 hours after each day's transactions
- Extremely complex website – many pages are generated dynamically creating complex clickstream trails

HP Vertica Solution

- Queries run in hours or even minutes; 48x – 100x faster
- Industry-standard SQL accelerated acceptance and proficiency
- Speed of HP Vertica allows iterative and recursive analysis for deeper dives
- HP can build functionality tailored to individual interactions based on nuanced understanding of user behavior at an individual level



金融業案例簡介



Vertica典型案例

	全球最大銀行之一	分析信用卡交易資料和使用者行為，即時偵測欺詐行為等 (88節點，1.5PB數據)
	全球歷史最長、規模最大的金融服務集團之一	根據使用者的投資記錄進行風險分析和管理。以前Oracle系統生成一份報告需要37分鐘，一天只能生產30多份。Vertica生成一份報告只需要9秒，每天能生成數千份。 (15節點，50TB數據)
	全球五大對沖基金公司之一	股票交易資料即時處理和模型驗證。即時裝載股票交易資料 (間隔10秒)，3秒完成處理。 (20節點，700TB數據，1TB / day，壓縮率6 : 1)
	中國第三大第三方交易公司，B2C支付，航空公司與旅遊，基金投資	理財基金交易和POS交易使用者行為分析。替代Oracle，生成報表時間從2小時降到5分鐘，批量處理過程從10小時降到40分鐘，總體性能提升10x。

準即時消費行為分析(V)

- 當日銷售分析:每日成交, 取消, 退款, 交換手續費, 票面價值 - 3.6 倍快
- 歷史分析:YoY MoM - 2.25 倍快

			mkt share	Transaction value
银联商务	Unionpay Merchant services	www.chinaums.com	46.30%	¥3,157,660,000,000
支付宝	Alipay	www.alipay.com	17.80%	¥1,212,860,000,000
汇付天下	Chinapnr	www.chinapnr.com	6.20%	¥422,840,000,000
通联	Allinpay	www.allinpay.com	5.50%	¥375,100,000,000
财付通	Tenpay	www.tenpay.com	5.30%	¥361,460,000,000
快钱	99bill	www.99bill.com	5.20%	¥354,640,000,000
衫德	SAND	www.sand.com.cn	3.40%	¥231,880,000,000
易宝	YEEPAY	www.yeepay.com	2.40%	¥163,680,000,000
SH银联	SH Unionpay Merchant services	www.chinaums.com	2.10%	¥143,220,000,000
GZ银联	GZ Unionpay Merchant services	www.chinaums.com	2.00%	¥136,400,000,000
环迅	ips	www.ips.com.cn	1.00%	¥68,200,000,000
	Other		2.80%	¥190,960,000,000



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國防及警察案例簡介



Face Analysis: Human information from images

Face Detection

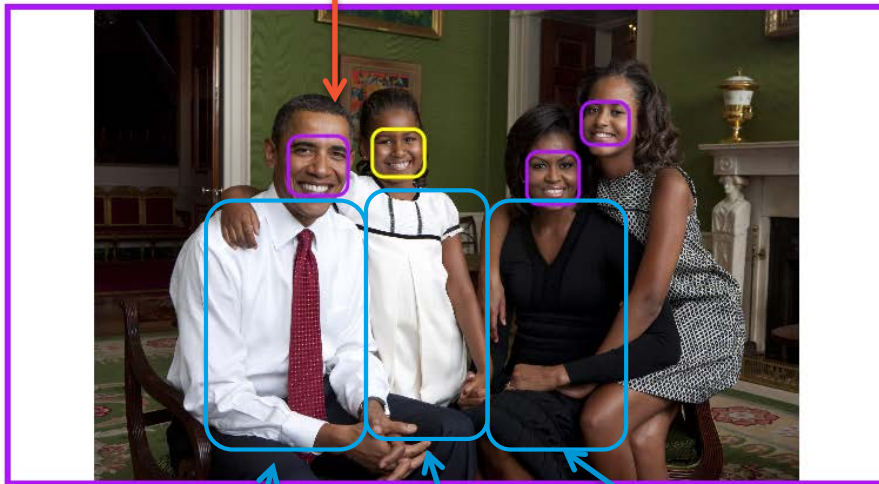
Found 4 faces in the image. Click a face to view details.

Face Analysis

Age	Youth
Gender	Female
Ethnicity	Black
Expression	Happy

Face Recognition

Found "President Obama" Face



Body Analysis

Primary clothing color = white
Not nude

Primary clothing color = white
Not nude

Primary clothing color = black
Not nude

Analyze – Scene Analysis (Base Protection)



Analyze – Scene Analysis (Prisons)



Case Study: License Plate Recognition



Case Study: License Plate Recognition

Autonomy Virage Automatic Number Plate Recognition v4.18

Options



44439 Patrol

PLATE	TIME	CODE	EM	TYPE
44439	15:00:53	B	DB	Private

44439 15:00:53 B DB Private

1 plate reads

Thank you !

