SAP on AWS and DB2 BLU In-Memory

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Princes Background

- Princes Limited, food and drinks company with a turnover of just under £1.5Bn
- 15 manufacturing plants
- 8000 employees
- Wholly-owned subsidiary of Mitsubishi Corp.

SAP Landscape – Background

- Princes went live with SAP R/3 in 1998
- BW and SCM introduced 2008
- CRM and BWonHANA introduced 2017

- Retained a standard Single Global Instance platform

- Migrated from Oracle to DB2 in 2012 - ***ERP database shrunk by from 2.6TB to 1.2TB and response time halved overnight***.

- Migrated from Windows to SLES and from third-party hosted data center to AWS, February 2018 – ***Doubled SAP performance and halved the cost.***

SAP Landscape – Current Detail

- **Platform**
  - SAP Netweaver 7.40
  - DB2 11.1.2.2
  - SLES 12.1

- **SAP Applications**
  - ERP 6 EHP7
  - SCM 7.1 EHP3
  - BW 7.40
  - BPC 10.1
  - EWM 9.3
  - Business Objects 4.2
  - CRM 7.0 EHP4
  - BWonHANA 7.50
  - SAP UI5 7.50
  - Solution Manager 7.2

SAP BW on DB2 BLU Pilot

Why?

- Fairly small BW system of 1200GB, of which 520GB was a single cube
- We paid our hosting partner by the GB for storage and were looking for cost efficiencies by reducing all database sizes
- We'd recently upgraded to DB2 v10.5 FP7SAP to gain BLU functionality

Approach

- Engaged with IBM through our good friend, Tim Main.
- Selected the largest cube in BW, as it was circa 40% of total database size.
- Increased server memory from 48GB to 128GB RAM.
- Reviewed and applied DB2-based SAP notes
- Used DB6CONV to flatten the cube.

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SAP BW on DB2 BLU Pilot Benefits

- ETL - 150% faster
- Queries – 58% faster
- Total Database Size – 20% reduction
- Largest cube reduced from 520GB to 98GB

KPI History - Last Month DB Growth
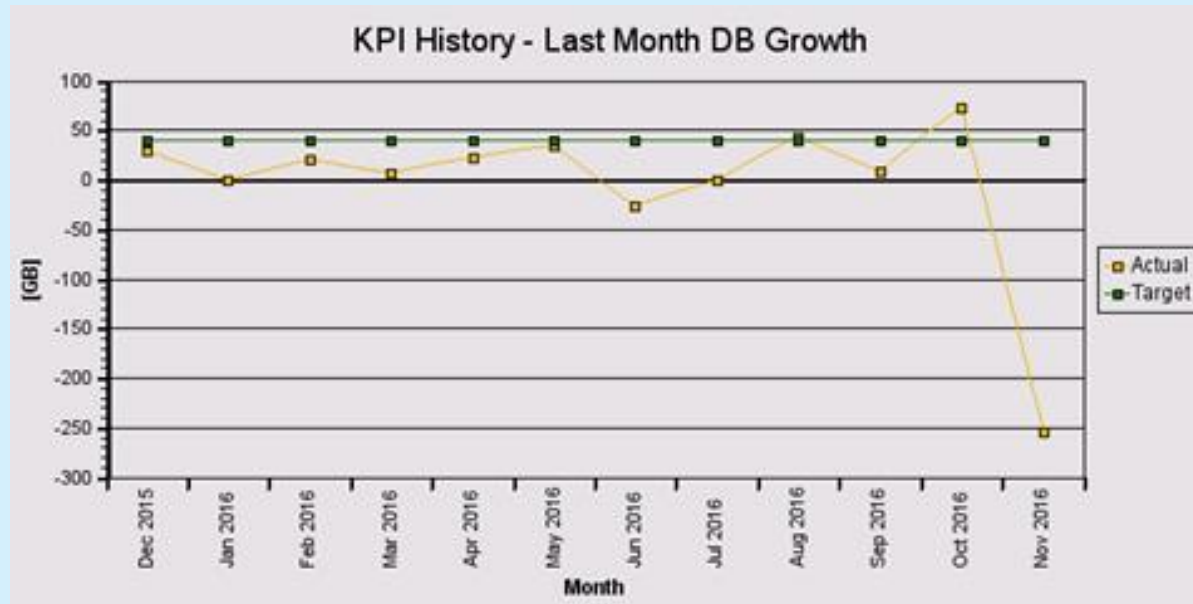
- Incredibly low cost migration, achieved in less than a week, end-to-end.

SAP BW on DB2 BLU Full Conversion

- The pilot's success made a full conversion of BW to BLU a simple decision.
- Engaged with the same team of IBM Engineers to guarantee a swift migration.
- Achieved a database size reduction from 1300GB to 770GB. (Sept. 2017)

- SAP BW was migrated to SLES and DB2 11.1 on AWS (Feb. 2018).
- Upgrading from DB2 10.5 to 11.1 achieved a further reduction to 480GB.

Date	Allocated Space (KB)	Change of Alloc. Space (KB)	Used Space (KB)	Change of Used Space (KB)
01.07.2017	1,230,600,656	0	1,200,137,840	0
01.08.2017	1,256,190,512	25,589,856	1,236,193,808	36,055,968
01.09.2017	1,334,682,752	78,492,240	1,328,232,896	92,039,088
01.10.2017	777,337,088	557,345,664-	771,274,880	556,958,016-
01.11.2017	800,772,544	23,435,456	792,828,128	21,553,248
01.12.2017	710,833,536	89,939,008-	690,201,664	102,626,464-
01.01.2018	731,168,528	20,334,992	711,657,520	21,455,856
01.02.2018	756,366,464	25,197,936	735,439,776	23,782,256
01.03.2018	479,670,208	276,696,256-	473,747,104	261,692,672-
01.04.2018	509,762,944	30,092,736	506,218,816	32,471,712
01.05.2018	551,688,256	41,925,312	508,496,832	2,278,016
01.06.2018	577,373,872	25,685,616	558,776,976	50,280,144

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Benefits – Additional / Lessons Learned

- No transaction logging issues during the migration.

- No hidden costs:
  - 5-days IBM Consultancy
  - 4*128GB RAM
  - Leverages existing SAP DB2 BLU license entitlement
  - ***Only slightly cheaper than migrating to HANA!!*** ☺

- Leverages existing SAP BW Basis / DB2 DBA skills

- Excellent teamwork and communication

Early Experiences with DB2 11.1 - Storage

- Cloned APO Development from on-premise DB2 10.5 to AWS-based DB2 11.1 host.
- Used standard DB2 Export/Import method for the migration.
- Enabled Adaptive compression.

- **Database size reduced from 146GB to 49GB**.

Tablespaces		
Last Analysis	20.07.2017 00:00:01	
Total Number	41	
Total Size	146,417,280	KB
Free Space	49,490,624	KB
Used Space	66.20	%

Tablespaces		
Last Analysis	20.07.2017 00:00:00	
Total Number	72	
Total Size	42,647,168	KB
Free Space	1,281,472	KB
Used Space	96.99	%

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DB2 11.1 Active Compression In Action

- We migrated each SAP database to AWS and between DB2 10.5 and 11.1 via export/import.
- Amazed to find that every database reduced by over 50% under DB2 11.1.
- Adaptive compression yielded savings of circa 70-90% per SAP table.

Current Savings:			2,931,903	MB		
Number of Compressed Tables:			4,480			

Table Schema	Table Name	Data Compression	Index Compression	Total Size (MB)	Savings (MB)	Savings (%)
SAPPRD	BSIS	Adaptive	✓	92,277	329,889	78
SAPPRD	FAGLFLEXA	Adaptive	✓	101,533	247,433	71
SAPPRD	COEP	Adaptive	✓	67,025	232,098	78
SAPPRD	GLPCA	Adaptive	✓	84,167	226,046	73
SAPPRD	ACCTIT	Adaptive	✓	28,577	111,972	80
SAPPRD	S033	Adaptive	✓	27,386	107,175	80
SAPPRD	LTAP	Adaptive	✓	34,613	83,699	71
SAPPRD	CE1ZPR2	Adaptive	✓	23,170	78,192	77
SAPPRD	MSEG	Adaptive	✓	22,613	66,216	75
SAPPRD	EBAN	Adaptive	✓	13,675	63,345	82
SAPPRD	COSP	Adaptive	✓	8,134	56,975	88
SAPPRD	CKMI1	Adaptive	✓	27,662	46,975	63
SAPPRD	AFRU	Adaptive	✓	9,903	46,357	82
SAPPRD	COSB	Adaptive	✓	4,350	44,110	91

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SAP ERP Production Database Size

Guess which month SAP was migrated to AWS and exported/imported to DB2 11.1

Date	Allocated Space (KB)	Change of Alloc. Space (KB)	Used Space (KB)	Change of Used Space (KB)
01.07.2017	2,392,567,216	0	2,390,174,128	0
01.08.2017	2,432,386,480	39,819,264	2,429,867,024	39,692,896
01.09.2017	2,462,089,712	29,703,232	2,459,548,240	29,681,216
01.10.2017	2,489,507,152	27,417,440	2,486,561,360	27,013,120
01.11.2017	2,523,061,584	33,554,432	2,520,522,000	33,960,640
01.12.2017	2,553,219,120	30,157,536	2,550,998,032	30,476,032
01.01.2018	2,579,592,224	26,373,104	2,577,329,312	26,331,280
01.02.2018	2,609,707,552	30,115,328	2,607,470,656	30,141,344
01.03.2018	1,333,821,312	1,275,886,240-	1,329,927,840	1,277,542,816-
01.04.2018	1,355,724,832	21,903,520	1,351,213,856	21,286,016
01.05.2018	1,375,139,472	19,414,640	1,371,004,720	19,790,864
01.06.2018	1,392,792,752	17,653,280	1,389,045,904	18,041,184

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Early Experiences with DB2 11.1 - Performance

- DBA*Cockpit Top Space Consumers and Backup Overview are known to be slow runners.
- Recorded the runtime of the transactions on both the on-premise APO Development instance and its AWS-based clone.

- 'Apples and Pears' comparison:
  - On-premise instance runs Windows and DB2 10.5 on VMware, hosted on 4 year-old servers and HDD storage.
  - AWS instance sits runs SUSE Linux and DB2 11.1 on latest CPU technology and SSD storage.
  - Results are based on the average runtime over three runs.

- Top Space Consumers
  - DB2 system   **40 seconds**.
  - AWS system   **4 seconds.**

- Backup Overview
  - DB2 system   **206 seconds.**
  - AWS system   **2 seconds**.

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DB2 vs. SAP HANA on AWS - Background

- Princes purchased SAP's Trade Promotions Management modules early 2017.

- TPM uses the Planning Application Kit, released only on BW on HANA.

- SAP's forced use of BW on HANA threatened my policy of consolidation and standardisation.

- Initial quotation for 4-tier BW on HANA physical appliance landscape was over £750,000.

- Decision made to migrate entire SAP estate to Amazon Web Services (AWS) platform.

Early Experiences of SAP HANA on AWS

- SAP's TPM sizing tool is out of date, with replacement promised, but often delayed.
- Feeling was that SAP's sizing for HANA was over-estimated, at 1.5TB RAM.
- AWS allowed us to start with smaller HANA instance, albeit still far larger than needed.
- Smallest HANA instance available in London region at the time had 488GB RAM and 64 CPUs.
- After nine months development, TPM's BW on HANA database size is only 25GB.

Database Memory and CPU		Database Disk Usage	
Memory Used/Allocation Limit	25,91 GB/ 256,00 GB	Data Volume Size/Disk Size	21,57 GB/ 599,71 GB
CPU Usage		Log Volume Size/Disk Size	8,03 GB/ 249,88 GB
Available CPUs	32	Trace Files/Disk Size	0,32 GB/ 299,85 GB

Host pfs44sap86dd

Memory and CPU		Disks	
Physical Memory Used/Available	43,13 GB/ 480,28 GB	Disk Containing Data Used/Total	24,51 GB/ 599,71 GB
Virtual Memory Used/Available	43,13 GB/ 640,28 GB	Disk Containing Log Used/Total	8,25 GB/ 249,88 GB
CPU Usage		Disk Containing Trace Used/Total	123,46 GB/ 299,85 GB
Available CPUs	32		

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Early cost comparison of DB2 vs. SAP HANA on AWS

AWS Hourly Rates						
On-demand Rates						
Description	**Type**	**RAM (GB)**	**CPU**	**Location**	**SLES**	**SLES for SAP**
SAP Development (DB2)	m4.2xlarge	32	8	London	$0.564	$1.424
				Dublin	$0.544	$1.404
SAP Development (HANA)	r4.16xlarge	488	64	London	$5.092	$5.952
				Dublin	$4.842	$5.702

RUNNING HANA INITIALLY COST PRINCES <u>10X</u> MORE THAN DB2 IN AWS.

TAKEN MUCH EFFORT TO REDUCE COST TO ONLY 4X THAT OF DB2

Lessons Learned

- New services are regularly introduced, often at a lower cost.
- AWS services do not cost the same across all regions.
- For HANA, start with the smallest possible instance size, and scale up when necessary.
- The SAP-variant of SUSE is only needed for HANA.
- Running the SAP-variant of SUSE on DB2 adds almost $1/hr to running costs.

Questions

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