Reshaping Applications and Business Intelligence at UTS

David O’Connor, Susan Gibson
A changing Landscape
Challenges for IT

• Complex architecture - big mix of legacy, modern, bespoke etc
• Pace of technology change
• Facing demands to be more agile
• Cost – do more with less/same
• Governance, security, privacy
• Many vendors to manage
• Explosion of data
• Managing identity across entire education lifecycle

To support the UTS vision of being a world leading university of technology – IT need to adapt.
For context - 80 staff responsible for everything from BI and DWH, ERP, learning systems, web, intranet, mobile, dev and integration etc.

- 2 year strategy to change the application landscape
- **Our mission**
  - Create a challenging, creative, professional, and fun team environment...
  - ...that enables us to consistently deliver innovative, user-centric, and appropriately scoped technology solutions...
  - ...that help drive UTS towards its goal of being a world leading university of technology.
1. Strategic relationship management
2. Application technology
3. Project management
4. Operational strategy
5. Staff learning, development & workplans
6. Modernisation & continuous improvement
7. Contractor & strategic
   11. Be a productive part of the UTS community
       • Everyone contributes to the UTS community in some way
       • We get out and talk about what we do
       • We consider a ‘UTS-first’ policy for expertise
       • We employ UTS students in our teams wherever possible
11. Be a productive part of the UTS community
12. Supporting an innovative culture
Supporting an Innovative Culture – Specifically in Data Warehousing and Business Intelligence
What data is available to analyse?

- Students
- Courses
- Enrolments
- Research Income
- Research Publications
- Learning Management
- HR
- Financials

- Light levels
- Room Temperature
- Humidity
- Air quality
- Energy
- Water Use
- People Counters

- Data collected in real time
The Challenge

We need a data warehouse ecosystem that can cope with:

- Hundreds of source systems
- Large scale data
- Data in all flavours
  - Structured
  - Unstructured
  - Real-time

Needs to be highly scalable
• Many different options and many price points
• Previously database servers were not used for heavy analytics but data would be transferred to a middle tier (e.g. cube)
• Led to compromise – could not drill through edge of cube- create new cubes – cube explosion – reconciliation and administrative nightmare
• Databases have developed technologies specific to data warehousing
  - high performance
  - large scale data sets
Multiple on premise options – require high capex

Recently Amazon Web Services released a new service globally – made available in Australia March 2014
• Columnar data store, data compression, parallel queries across multiple nodes - very high performance
• Elastic cloud architecture – can scale as required
• Cost are actually very low – no capex investment required.
• SAAS
• Increased development agility
• Petabyte scale data warehouse
Data in Data Warehouse

- Course and Subject Details
- Student Lifecycle data including enrolments, attrition, completion
- Fee Income
- Results and Grades
- UAC
- Research Data

• Biggest Table – 2.2 Billion rows (daily snapshot of student load for 18 months)
- Sub 10 second queries to summarise load by day
- 813 entities

Cost

- 1 TB Development and Production Environment
- Combined $5,000 per month
Amazon Web Services Ecosystem

Amazon Web Services

Compute
- EC2: Virtual Servers in the Cloud
- Lambda: Run Code in Response to Events
- EC2 Container Service: Host and Manage Docker Containers

Storage & Content Delivery
- S3: Scalable Storage for the Cloud
- Storage Gateway: Integrate On-Premises IT Environments with Cloud Storage
- Glacier: Archive Storage in the Cloud
- CloudFront: Global Content Delivery Network

Database
- RDS: MySQL, PostgreSQL, Oracle, SQL Server, and Amazon Aurora
- DynamoDB: Predictable and Scalable NoSQL Data Store
- ElastiCache: In-Memory Cache
- Redshift: Managed Petabyte-Scale Data Warehouse Services

Networking
- VPC: Private Cloud Resources
- Direct Connect: Dedicated Network Connection to AWS
- Route 53: Domain DNS and Domain Name Registration

Administration & Security
- Directory Service: Managed Directories in the Cloud
- Identity & Access Management: Access Control and Key Management
- Trusted Advisor: AWS Cloud Optimization Expert
- CloudTrail: User Activity and Change Tracing
- Config: Resource Configurations and Inventory
- CloudWatch: Resource and Application Monitoring

Deployment & Management
- Elastic Beanstalk: AWS Application Container
- OpsWorks: Chef-based Application Management Service
- CloudFormation: Template-based AWS Resource Creation
- CodeDeploy: Automates Deployments

Analytics
- EMR: Managed Hadoop Framework
- Kinesis: Real-time Processing of Streaming Big Data
- Data Pipeline: Orchestrates Data-Driven Workflows
- Machine Learning: Build Smart Applications Quickly and Easily

Application Services
- SQS: Message Queue Service
- SWF: WorkFlow Service for Coordinating Application Components
- AppStream: Low Latency Application Streaming
- Elastic Transcoder: Easy-to-use Video Transcoding
- SES: Email Sending Service
- CloudSearch: Search Engine Service

Mobile Services
- Cognito: User Identity and Auth Data synchronization
- Mobile Analytics: Associate App Usage Data at Scale
- SMS: Text Notification Service

Enterprise Applications
- WorkSpaces: Desktops in the Cloud
- WorkDocs: Secure Enterprise Storage and Sharing Service
- WorkMail: Secure Email and Calendaring Service

Resource Groups

Creating 

Additional Resources

Getting Started
See our documentation to get started and learn more about how to use our services.

AWS Console Mobile App
View your resources on the go with our AWS console mobile app, available from Amazon Appstore, Google Play, or iTunes.

AWS Marketplace
Find and buy software, launch with 1-click and pay by the hour.

AWS Summit - San Francisco
Learn about the exciting new services and features announced at the AWS Summit in San Francisco

Service Health
- All services operating normally.
- Updated May 09, 2015 12:09:04 PDT+1000
- Service Health Dashboard
It wasn’t all plain sailing

• Finding the right people and keeping them
• Legal, Governance, Security, Architecture
• Simple technical issues such as ODBC, JDBC issues, getting out of the UTS network, ensuring VPC is secure, forcing queries back to database
• Consider how long you can stay in a situation where you are making compromises
• None of the challenges were insurmountable but you need to be persistent