Client Computing Program
Desktop as a Service (DaaS)
Proof of Concept

ACU
AUSTRALIAN CATHOLIC UNIVERSITY

cloud
solutions group

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

High level Requirements

- Deliver Desktops and Applications to any device anywhere
- Enable BYOD and Mobile device security
- Improved ability for students to collaborate on projects
- Reduce management overheads for Workstation fleet
- Extend desktop fleet lifespan by repurposing them as thin clients

Background

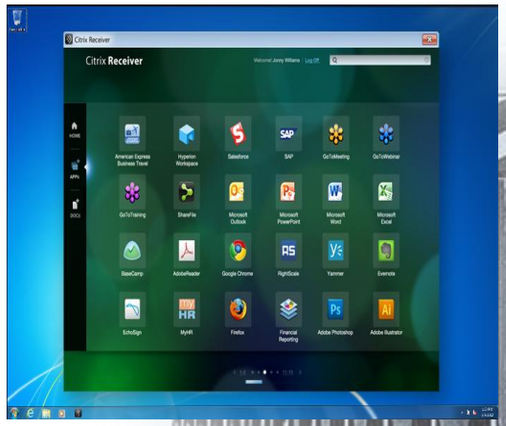
- The IT team had previously investigated virtual desktops delivered with VMware View and were keen to compare this with the offerings from Citrix.
- This particular pilot project was implemented with the principal strategy of delivering a standard desktop from the cloud , delivered across the public internet as a Managed Service.
- Deliver Desktop as a Server (DaaS).

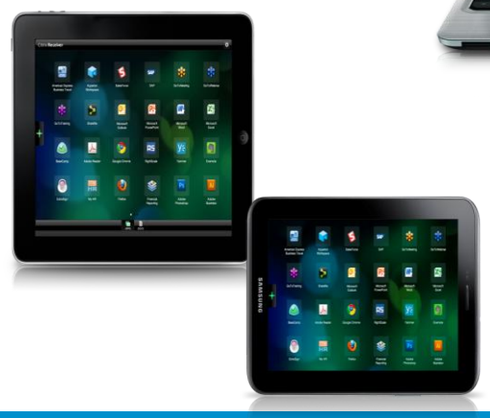
AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Vision – Deliver Desktop as a Service

Desktops and Apps as-a-Service





ACU Campuses

- **Ballarat Campus**
- **Brisbane Campus**
- **Canberra Campus**
- **Melbourne Campus**
- **North Sydney Campus**
- **Strathfield Campus**

Current State

- Student Domain - 2000 Dell OptiPlex computers located in teaching Labs and Library Commons.
- Core SOE plus some campus specific teaching applications.
- Combination of campus based ghosting of core images and nationally managed SCCM deployment of some applications.
- The original goal was to move to a wholly SCCM deployed OS and applications.
- Alternative solutions were investigated i.e. Virtual Desktops including VMware and Citrix solutions.

Citrix Technology Selection

- Based on site visits to other Universities, Citrix was selected. The next decision was which type of Citrix solution to use, XenDesktop or XenApp.
- **XenDesktop-** each user gets their own virtual desktop running on their own virtual machine. Each virtual machine is an instance of Windows 7. This provides an environment equivalent to a traditional desktop on a physical machine.
- **XenApp or session virtualisation-** uses either application streaming to deliver applications to hosted servers, or fully installed applications on a template server OS, which is then provisioned to hosting servers in a XenApp farm.

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Citrix Technology Selection

- For the purposes of the POC- the desktops were to be delivered from a public cloud.
- Public cloud licensing constraints necessitated the selection of a XenApp shared desktop environment.
- The environment was based on a provisioned server 2008 OS with a reduced set of our SOE applications installed into the template server.
- A single connection was configured as a virtual private network (VPN)

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

What We Considered

- Utilising on premise infrastructure to provide infrastructure for the POC
- Managed Private Cloud to provide infrastructure for the POC
- Leverage Amazon Web Services to provide Cloud IaaS for the POC

What We Ruled Out

- On-premise infrastructure was ruled out owing to capacity constraints and lack of internal Citrix Skills.
- Managed Private Cloud was ruled out owing to upfront costs and time constraints to procure hardware and establish the required infrastructure.
- AWS had just established presence in Australian shores and was not ready to provide a fully functional solution.

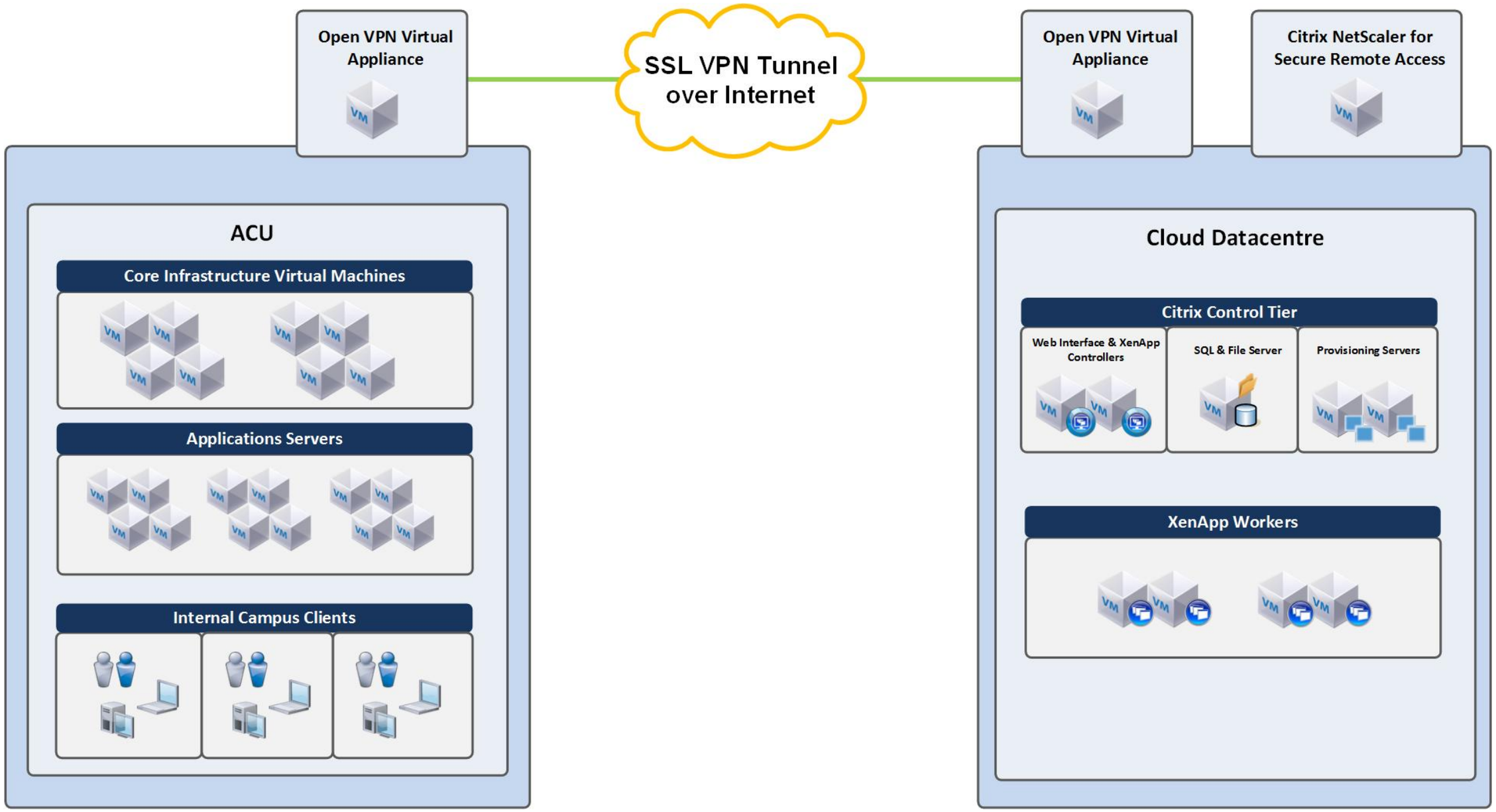
AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Solution Overview

- Ninefold leveraged for Cloud IaaS
- VPN established to Ninefold to provide secure connectivity to ACU's backend applications and Infrastructure
- Citrix XenApp to deliver published desktops and applications
- Citrix NetScaler for Secure Remote Access to the environment from any location

Solution Overview - Diagram



AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Secure Connectivity to the Cloud

- To provide secure connectivity from the on premise environment to the cloud an SSL VPN was established
- OpenVPN Virtual Appliances were deployed in each Datacentre
- SSL Certificates were used for authentication between the appliances

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Desktop & Application Delivery

- Citrix XenApp was utilised to deliver published Applications & Desktop to users
- With the use of Citrix Receiver users can launch a full desktop environment or individual applications
- Users have access to the published resources from any location or any device

Any Device, Any Location

Unified App Store

- Available on 3B+ devices
- Mobile apps native on device
- Windows, Web & SaaS apps delivered via Receiver
- Any device – smartphone, tablet, PC and Mac

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Secure Remote Access

- Citrix NetScaler Access Gateway was utilised to secure all remote connectivity to the environment
- SSL encrypted access to published applications and desktop
- Users with an internet connection can securely connect to required resources from any location

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Secure Remote Access

Universal client

Network connectivity

Datacenter and cloud services

Access to Desktops and Apps from any location on any device

Secured enterprise access

Desktop & app virtualisation

Ninefold Cloud IaaS

- Ninefold leveraged to deliver the infrastructure required for the DaaS environment
- Ninefold is a subsidiary of Macquarie telecom and provides true pay as you go Cloud IaaS
- Multiple availability zones are available to architect for high availability
- Each Virtual Server in the DaaS architecture was provisioned at Ninefold

Use Case Evaluated

STUDENT LIBRARY COMMONS COMPUTERS

- This use case evaluated replacing the typical Library Commons machines with a virtual desktop solution.
- For end user ease of access to the virtual desktops, the PC's were re-purposed as thin clients that booted directly into the XenApp environment.
- Student use cases are particularly sensitive to audio/video performance issues due to requirements for instruction-related multimedia.

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Library Client Connectivity

- Existing Dell Desktops were re-purposed as thin clients using software
- IGEL Universal Desktop Converter was used to convert the Desktops to Thin Clients
- The Desktops connect to a IGEL Universal Management Suite (UMS Server) in the cloud
- The UMS server automates client configuration, licenses and connectivity to the DaaS
- All thin client management is performed via central IGEL UMS, simplifying administration

IGEL Management

IGEL Universal Management Suite

System | Edit | Thin Clients | Misc | Help

IGEL UMS - ADMINISTRATOR@localhost

- IGEL Universal Management Suite
  - Profiles
  - Thin Clients
    - A configuration sample
    - CE Devices
    - ES Devices
    - LX Devices
      - IGEL-000C290918CF
      - IGEL-000C295DA018
      - IGEL-000C29E26EBA
      - IGEL-00E0C5600FE6
  - Views
  - Jobs
  - Files
  - Universal Firmware Update

/Thin Clients/LX Devices/IGEL-00E0C5600FE6

System information

Attribute	Value
Name	IGEL-00E0C5600FE6
Last IP	10.201.0.28
Site	
Comment	
Department	
Asset ID	
In-Service Date	
Serial Number	

Attribute	Value
MAC Address	00-E0-C5-60-0F-E6
Product	IGEL Universal Desktop LX
Product ID	UD5-720 LX
Firmware	4.04.500.01
Last boot time	
CPU speed (MHz)	1496
CPU type	VIA C7 Processor 1500MHz
Flash size (MB)	974
Memory size (MB)	749
Graphics chipset 1	VIA Chrome9
Graphics memory 1 (MB)	256
Graphics chipset 2	
Graphics memory 2 (MB)	
Device type	IGEL UD5

Assigned objects

Name
Citrix Access Gateway
LPD Printer
Update Server

Indirect assigned objects

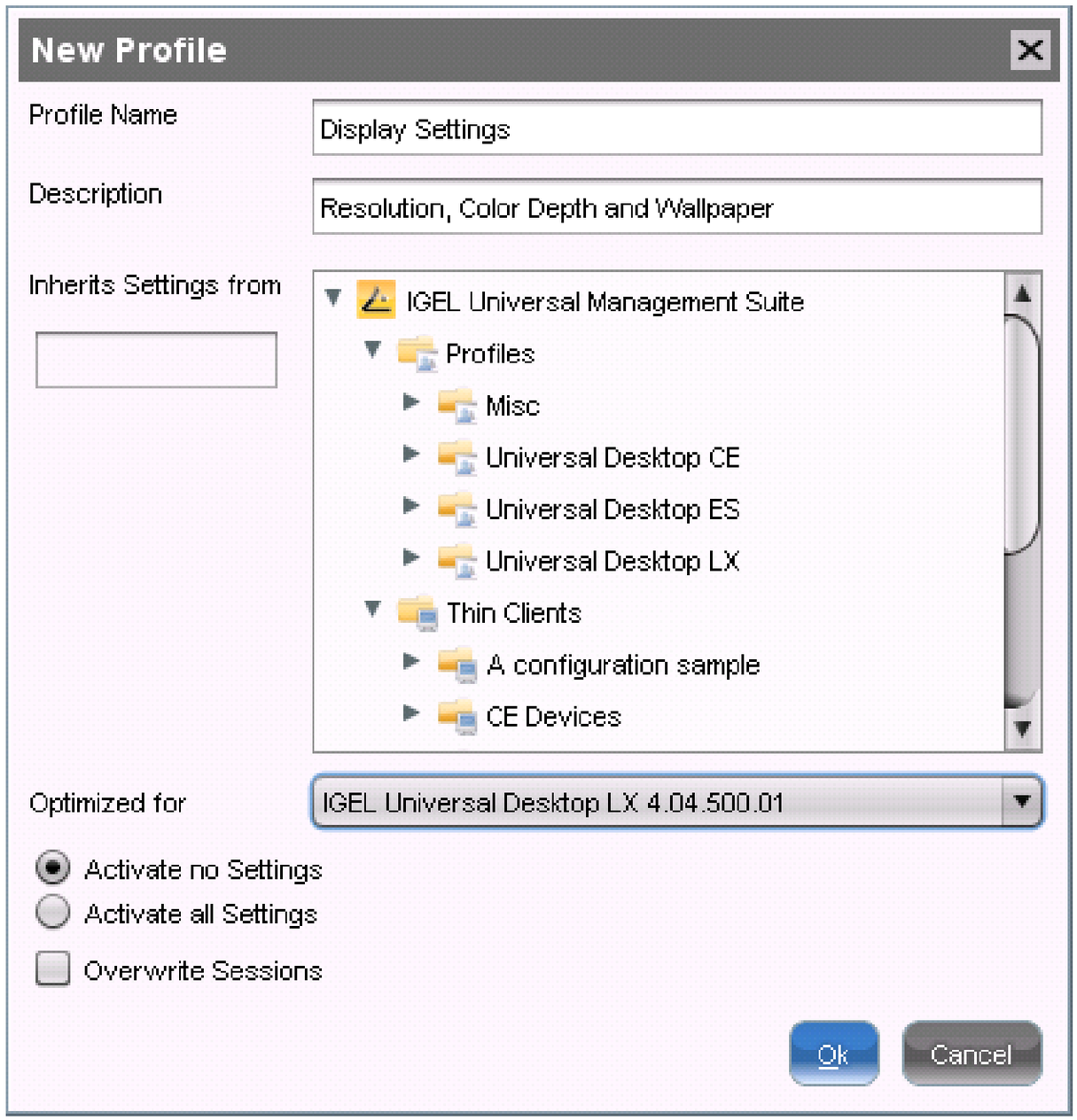
Directory	Name

Messages

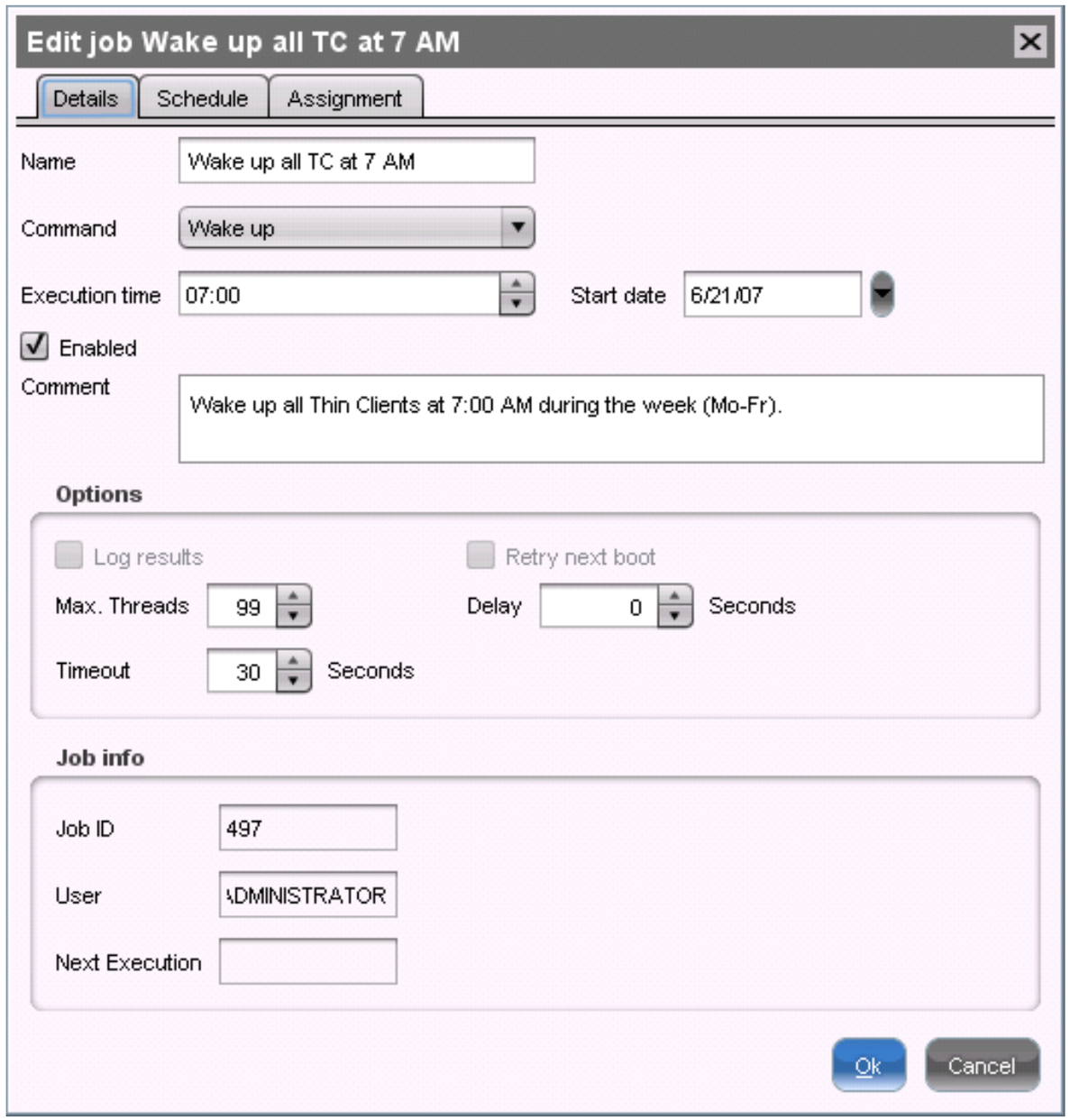
Time	Description	Results	State

Connected to localhost as ADMINISTRATOR

IGEL Management



IGEL Management



AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Location Based Printing

- User Printer configuration was automated using Citrix Policies
- Printers were automatically created based on the source IP address of the connecting client
- Integrated seamlessly with ACU's print management solution Papercut
- Single Universal Driver was used for all required printers

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Use Cases to be Evaluated

- Bring Your Own Device
- Lab PC managed using Citrix Streaming Technology for Golden Image Management
- Access to University applications via iOS and Android based devices-Tablets, Ultrabooks etc
- Remote Access and work from home

BYOD - Flexible Work styles

- Accessing Desktops and Apps on demand allows students to:
  - Work from any location at their convenience
  - Easier collaboration with students on shared projects and assignments
  - Work can be printed from home and collected when arriving on campus – no need to book library computers
  - Simplified access to curriculum material reduces dependency on University managed physical desktops

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Lab PC Management

- Utilise Citrix Provisioning Services to stream Operating System
- Golden Image created and managed centrally
- Read only Image is streamed to physical computers in labs
- Upon device reboot, device returns to a clean state

User Feedback

- Desktop – launch of desktop / initially login time was slower
  - Resolved by deploying Domain Controller in cloud datacentre.
  - Streamlined Group Policies/Citrix policies
    - Also dependent on XenApp servers resource load
- Applications – Application performance comparable to physical desktop
  - A couple instances of Internet Explorer freezing
  - Reported in Citrix EdgeSight

User Feedback (cont)

- Audio/video performance - Good
  - YouTube FLV and Library reference material AVI all compared favourably to physical desktop , sometimes imperfect synchronisation but no video freeze or audio dropout.
- Profile management – Seamless
- Printing – Experience was great- added value of location based printing

Lessons Learnt

- Network connectivity planning and engaging internal network team
    - Improved communication with ACU's network team could have prevented delays in establishing the tunnel
- End User communication and POC briefings
    - Limited End User briefings were conducted. End user experience could have been improved by better communication and management of expectations of the technology.

Lessons Learnt (cont)

- Define all use cases to be tested
  - Limited time was allocated for the POC as it was end of semester
- Set clearly defined success criteria
  - Feedback was very much ad hoc and would be better if had a detailed checklist

Cloud IaaS Benefits

- Proof of Concept can be established quickly
- Can quickly expand infrastructure to cater for additional users
- Pay as you go, predictable costs
- Can architect for multi-zone high availability
- Simple to manage and provision required infrastructure
- Great for Proof of Concept and Test & Dev use cases beyond DaaS
- ACU can now easily provision new servers for alternative solutions/initiatives

Cloud IaaS Challenges

- Bandwidth is important to ensure a positive end user experience
- Costs for large scale and consistent deployment exceed on premise equivalent
- Limited view/control of underlying infrastructure

Outcomes to Date

- POC as scoped was successful in a technological sense
- Lessons learnt highlighted logistics issues with running the pilot across all campuses

Moving Forward

- Further testing of SOE
- A wide variety of specific teaching software
  - Access suitability for virtualisation
- BYOD – conduct a trial on Library Laptops/iPads
- Home Access

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Journey to the Cloud

- Utilise Amazon Web Services to Establish Virtual Private Cloud environment (VPC)
- Leverage AWS peering with AARENT for free ONNET traffic between Cloud and On Premise
- Second phase of DaaS POC to operate of out AWS VPC
- Utilise AWS VPC for future POC's, Test & Dev
- Utilise AWS S3 and Glacier for Backup and long term Archives

AUSTRALIAN CATHOLIC UNIVERSITY

cloud solutions group

Questions ?

cloud solutions group