FUJITSU

White Paper

End User Computing for Tertiary Education

Contents

1 Introduction

"Devices will replace academic faculty by 2030. The concept of individual campuses will slowly disappear. The two-semester pattern will be replaced by year-round learning.

Professors will typically appear remotely from some type of broadcast centre, and the concept of individual campuses will slowly disappear as more and more students pursue their studies from home, workplaces, park benches or coffee shops. Place-based education will not disappear entirely; as well as being places of learning, campuses are a force for socialisation, where children mature into adults through interaction with others before they embark on careers."

Professor Stephen J. Trachtenberg, George Washington University, Washington DC.
"Future perfect: what will universities look like in 2030?" Times Higher Education, December 2015

Tertiary education is undergoing a revolution, one in which learning no longer takes place solely in lecture theatres and computer labs. The future of tertiary education will see students choose the pace, location, and medium through which they learn.

This change is being realised in technology with a shift in focus from the management of devices and desktops, to the provision of applications that can be accessed from anywhere on any device.

Traditionally the technology industry (including internal IT departments) have counted and managed desktops. A University may have 5,000 computers and therefore the focus has been on how to distribute applications to those 5,000 desktops. However, the real goal isn't how to put applications on 5,000 desktops, the goal is how to get the applications and information to 30,000 students and staff so they can access them where, how and when they want.

Fujitsu's global vision is focused on a concept we call the Human Centric, Intelligent Society. This aligns with the future of tertiary education as it places the human (end user or student) at the centre of the picture, a concept which seems obvious, but until now the technology industry has placed the device at the centre of their focus.

This is all about to change.

1.1 The Tipping Point: Desktop as a Service

The advent of Desktop-as-a-Service offerings in the market provides the opportunity to review how applications and data can be delivered to end users, freeing us from a device based world, to a world in which applications and data become the focus.

Whilst not all Desktop-as-a-Service (DaaS) services are equal, they do have key elements in common;

- A platform that allows application delivery to be scaled according to demand
- Options for desktop and/or application delivery; understanding that a 'one size fits all' approach is no longer required
- Delivered 'as-a-service' meaning customers only pay for what they consume without the cost of owning and managing the delivery platform

Comprehensive DaaS providers go even further delivering;

- Self-service, often including full automation, to reduce operational overhead
- The ability to manage both traditional and virtual desktops with a seamless roaming experience
- A platform that offers users multiple operating system versions to best meet the device and application being used at a point in time
- Integrated and connected services delivering end-to-end managed desktop services
- Options for availability and disaster recovery

Tertiary education is a key sector where a comprehensive, managed DaaS solution can add real value, through enabling the upcoming revolution in tertiary education, and providing significant efficiencies to optimise today's tertiary education model.

With a range of user types each with differing demands and requirements for access, mobility, connectivity and even devices, a comprehensive DaaS solution can drive real benefits. This whitepaper describes how such a service could be used to achieve significant business outcomes including new revenue opportunities, reduced operational costs, increased productivity and improved end user experience.

1.2 Fujitsu's Solution

Fujitsu's GoDaaS offering is a complete application and desktop solution. It provides an entire range of services typical of an end user computing environment including published applications, virtual and traditional desktops, application packaging, device procurement and full support.

GoDaaS also includes a fully automated self-service portal to increase productivity and reduce manual administrative effort and cost.

GoDaaS has been developed as an "as a Service" model; enabling services to be scaled to meet a customer's changing needs without locking in unnecessary capital expense. The platform is evergreen meaning that virtual desktop operating systems are continuously updated and ensuring that the latest desktop operating systems as well as tools and services are available for uptake as required. This flexible and scalable model allows services to be selected that work best to meet business requirements as well as providing options for the future.

1.3 Benefits for Tertiary Education

A tertiary education institute has a range of end user types. With a flexible DaaS platform the requirements for how users access their data and applications can be aligned to the options that best suit their working style. For example;

- Students can use published applications and virtual desktops from their own devices (BYOD) potentially provided by the institute at a nominal cost to generate income for the institute
- Academia can use traditional and virtual desktops to enable on-shore, mobile and overseas access with a consistent experience
- Administration staff can make use of low cost shared desktops on thin client devices to drive down cost
- Graduate staff can use dedicated virtual desktops when required for high compute requirements without the capital expense of high-end devices

Use of a platform such as GoDaaS allows a tertiary education institute to broaden and diversify the range of service options available to their end users but this does not correlate to increased operational costs - in fact the reverse may be true as Fujitsu is accountable for ensuring the platform is available, secure and resilient. This reduces the need for IT staff to be involved in the day to day operations of the desktop environment, freeing up valuable resource to focus on delivery of business projects.

This whitepaper explores three potential drivers for change that may benefit a tertiary education institute

1. New revenue opportunities
2. Improved customer experience
3. Cost savings

2 New Revenue Opportunities

Using GoDaaS presents the opportunity for a tertiary education institute to reach a wider student audience and to expand the capacity of its courses through the use of new technology. Below are some key examples of how this can be achieved.

2.1 Accommodation Challenges

Some institutes currently experience accommodation challenges such as when all CBT (computer based training) is performed in physical labs located on campus. This limits the institute's ability to expand its student base through two factors, geographic coverage and lab capacity.

- Geographic Coverage. - In order for a student to participate in a course they must be within the geographic coverage of the campus. This limits the market for the course, shutting out potential students that live outside the campus city, or outside of New Zealand.
- Lab Capacity. - The student intake for all CBT courses is limited to the available lab capacity. For example, some courses require a one to one ratio of available lab computers to students. This has two limitations; maximum intake for a course is restricted to the number of computers available, and imposes a cost burden for smaller, specialised courses that do not need the full lab capacity. The institute is then caught in a dilemma between maximising revenue from having large labs available to cater to peak demand, and minimising cost by keeping the labs to a size large enough to cater for the average course demand (as opposed to peak demand).

To expand and capture a wider student base this could mean establishing physical computer labs in multiple locations, and expanding existing lab facilities to ensure that demand for courses is not limited by lab capacity. This would require capital investment, not just in computer infrastructure but also in the physical campus space and facilities.

By enabling students to access CBT courses from outside of the current physical labs this challenge is overcome allowing the institute to gain access to a wider market. This has the added benefit of also giving students the freedom to learn where they prefer rather than forcing them to be present in a physical lab. This may open up new markets reaching students that do not wish to attend a physical campus even though they are within the geographic coverage area of an existing lab. Such students could be mature students that do not wish to attend a university campus, or professionals that are attending a course during their working day and can afford an hour for a lecture if they are able to do so from their office rather than travelling to a physical campus.

The solution to this challenge is the use of Virtual Labs.

2.2 Virtual Lab Solution

Today many institutes are recording and publishing lectures online in video/slideshow format, enabling students to attend classes at a time and location that suits. However, for CBT courses there is still a requirement to attend in person at a physical lab to gain access to the applications and systems related to the course. A virtual lab would allow students to remotely access the lab environment from almost any device, anywhere in the world, at any time. By delivering through a virtual desktop and/or published applications the full lab experience can be easily replicated.

The following suggestions match teaching scenarios with the use of virtual labs to enable a lower cost, more flexible means of delivering courses.

On campus BYOD labs

For campuses that have large lecture theatres or classrooms without computing facilities, these could be turned into computer labs by enabling students to use virtual desktops equivalent to lab desktops from their own devices. These days the majority of students own a device and the requirement to run a virtual desktop is very basic. Most devices, even the lowest cost laptops and Chromebooks, can be used to run virtual desktops through use of a Citrix Receiver (free to download) and Wi-Fi. This option will allow students to access the resources of a full powered lab PC without the cost of the institute purchasing and maintaining hardware and maintaining SOE builds.

On campus overflow labs

For courses that have a demand exceeding the capacity of the current physical labs (or for running simultaneous courses when a lab is already booked), a non-computer lecture theatre/classroom could be quickly equipped with low cost devices such as thin clients or Chromebooks to access the virtual lab desktop. The setup time would be no more than handing each student a device as they walked into the room, and collecting them at the end of the lecture. For example, the use of a Chromebook would incur a cost of under $500 per device and yet provide a very useable and suitable experience for the student.

Thin client or Chromebook type devices are recommended in this scenario for two reasons, (1) they do not require expensive OS licenses and (2), the cost of the device makes it more suitable for management as a consumable rather than an asset with warranty and maintenance costs. Both of these factors also allow the device to be quickly swapped out in the event of failure, increasing productivity.

Off campus temporary courses

Using either BYOD or low cost devices an institute is able to run a course in a city/town where they have no campus but could rent temporary space at a conference centre/local school/polytechnic with access to Wi-Fi and high speed internet.

Virtual Classrooms

Whilst the previous examples rely on physical premises, the solution also provides consideration for virtual classrooms enabling students to attend the course from their own location (such as work or home) through the use of a virtual desktop using their own device and network connectivity. Using cloud based connectivity suites such as Skype for Business classes can be taught from the tutors' own office locations. Using this solution any student connected to the Internet can access the full lab desktop and live virtual classrooms giving the student the full lecture/lab experience from anywhere in the world.

Classrooms on Demand

Taking the virtual classroom idea one step further, combining recorded lectures streamed to the student via the virtual classroom, with the use of a virtual lab desktop and even the ability to chat with the tutor, the student is then able to learn wherever and whenever they want. This opens up a whole new market of students that want to attend a course but have full time work commitments, are in a different time zone, or otherwise unable to attend a physical classroom.

Complex / Specialist Labs

In addition to the general labs there are numerous specialist labs that contain either high-end Windows based CAD workstations, or high-end Macs for design schools. The virtualization and

delivery of these high end services to students remotely presents a different set of opportunities and challenges.

Labs that are used for 3D modelling and CAD applications are currently equipped with high end workstations with expensive GPUs that are necessary to enable the use of the specific applications used by the course (for example Autodesk AutoCAD).

It is possible to successfully virtualize 3D workstations and deliver an equivalent level of performance using a virtual desktop. This is achieved by equipping a pool of virtual desktops within GoDaaS with high-end GPUs which combined with the Citrix HDX protocol enables hi-resolution displays to be delivered to students.

The benefit of virtualizing the 3D workstations is that it enables all of the scenarios described above (online labs, time-shifting, and overflow labs) therefore opening up a far wider student market, while at the same time containing the cost of 3D workstations.

2.3 Benefits of GoDaaS

Any of the virtual lab solutions noted above can be achieved by providing the current physical lab desktops via GoDaaS as a virtual desktop. This means students receive identical applications, data, and environment (i.e. combination of apps, data, IDEs, databases, etc.) as they would access on a physical lab PC. The only device requirements for the student would be a suitable combination of screen-size, keyboard, and mouse and a device capable of running Citrix Receiver. This provides institutes the opportunity to offer a range of devices such as BYOD, thin clients, low cost devices such as Chromebooks - or any combination thereof, for a set fee if desired.

In addition, Fujitsu are working to integrate cloud offerings such as Skype for Business with GoDaaS which can then introduce concepts such as virtual classrooms without an institute needing to develop integration and support skills.

In summary, the solutions afforded through the use of GoDaaS to deliver additional, more flexible labs for students can drive increased revenue and lower the cost of delivery.

3 Improved Customer Experience

Often institutes use decentralized models for Academia and administration staff, with local storage on the PC for the majority of user data and files. Applications are deployed to the device in a traditional fat client model, and users often have local administrator rights allowing them to install software themselves.

This desktop management model provides a high degree of user freedom and sense of autonomy over their desktop however is considered an expensive model to manage - particularly if the end-user demands support for any element they have self-installed. Some of the key challenges with a decentralised model are as follows:

- Risks of data loss due to local storage of files on devices - if a device fails or a file is deleted there is no centralised backup and restore system.
- Chained to a specific device - as a user's files, settings and applications are all located on a specific device the user is unable to work with any degree of success on any other device. This may not appear to be a problem if staff are predominantly desk bound and have no need to use other devices, however does limit the ability to collaborate or work from anywhere without taking their device with them (increasing risk of damage or loss). This may impact any future innovation on resource management and mobility models an institute wishes to deploy.
- "Wipe and rebuild" support model - the only cost-effective way to provide support of a decentralised, locally administered PC is to wipe the device and rebuild it back to a default state. This leaves the issue of reinstalling all of applications, data (assuming the data was backed up) and reconfiguration of personalisation. VIP users (and often wider groups) expect this to be provided by IT which can be very expensive as it requires a lengthy desk side visit. Alternately it has a productivity cost if the user has to do this themselves - typically also resulting in a level of frustration degrading any end user satisfaction model reporting.
- Lack of remote access - the users have no access to their files or applications unless they have access to their device, therefore working away means lugging laptops and related peripherals around, even if it is just to work at home.

While the decentralised model may seem preferable to users under normal circumstances, the limitations above will eventually become evident and lead to user dissatisfaction. Our experience has found that as long as local storage is available and file redirection isn't in place, users will default to saving files into the local My Documents folders, leaving them exposed to a loss of data.

The industry best practice for desktop environments is to have no volatile or corporate data stored on the device, wherever possible limit local deployment of applications, and restrict local administrator access to IT support personnel.

3.1 Benefits of Standardised and Centralised Desktop Environment

Moving to a centralised managed desktop model as provided by GoDaaS the following benefits would be realised to provide an improved customer experience:

- Instant application provisioning - using the GoDaaS self-service portal users could self-provision a range of applications and/or virtual desktops and have them available almost immediately (subject to approval workflows).

- Fully backed up data storage - using either the institute's own storage system or cloud storage such as Microsoft's OneDrive (or a combination of the two), all user data would be stored centrally and backed up.
- Mobility - users would no longer be tied to a specific device, they would have full access to their data and applications from any device. This would apply to both traditional fat-client devices and virtual desktops. GoDaaS also provides full remote access so that users could work from anywhere.
- User centric support - using the ability of GoDaaS to roll back individual application settings to a last known working condition, the requirement to reset user profiles would be largely eliminated. Even in the catastrophic event that a device did need to be fully rebuilt a user could simply work from any other device with no loss of data or applications whilst it was being done.
- Even using a traditional fat-client device working off-line, this can be configured with a GoDaaS option for off-line file sharing; essentially ensuring the on-line files are available off-line and then automatically and appropriately synced to the latest version when back on-line.

So while some users may initially feel that the loss of local administrative rights to their desktop is a negative, the benefits gained from a centralised managed model and the ability to logon from any device from any location at any time quickly outweighs the emotional attachment to local administrative rights.

4 Cost Savings

There are several ways in which GoDaaS could reduce costs for managed desktop services, however cost savings are not the primary driver for organisations considering a managed desktop service. Depending upon the current investment and service levels it may be that a managed desktop service incurs a neutral or slightly increased cost from an in-house decentralised model but equally can afford opportunities to increase revenue.

The areas in which GoDaaS could be used to reduce or minimise costs and/or increase productivity time include;

- Rationalised Capital Investment;
- Reduction in Support Costs;
- Managing the full Desktop TCO model; and
- Reduction in Software Licensing.

4.1 Shift Capital investment to a Pay as You Go model

Use of GoDaaS provides an opportunity to move capital expenditure into an "as a service" OpEx (operational expenditure) model. This isn't simply about switching from CapEx (capital expenditure) to OpEx as this can be achieved through leasing and financing, it is about moving from a fixed upfront investment to a flexible "pay as you go" consumption based model.

Under a CapEx model an upfront investment is made based on a defined capacity of users. As the actual number of users (students and staff) changes, the CapEx investment will either be too low, in which case the institute will be missing out on potential revenue, or too high in which case the use of CapEx will be stranded and not returning the ROI that was expected. This is particularly relevant for the high-end workstations used in 3D labs as they are both a significant CapEx investment and a finite capacity resource that determines the maximum student intake for the course.

Under an "as a Service" model there are two ways to address this; the first is to rent the hardware on a monthly basis, allowing capacity to be flexed up and down as demand changes. The second is to shift from purchasing expensive high-end workstations to low cost thin-client devices, reducing the amount of CapEx required, and enabling the institute to purchase surplus capacity for peak times with a minimal amount of CapEx.

These two options can be combined, and can even be blended with the traditional CapEx and high-end workstation approach. For example, if the institute already has a desktop fleet, at least a 3rd of which will be current and a 3rd will be due for replacement (based on a 3 year refresh cycle). The devices due for replacement could be replaced with thin-clients, of which 70% might be purchased outright (as this will usually be the most cost effective means of buying an asset for long term use), 20% could be leased on a 12 month period, and 10% rented month to month. This model can be compared to the use of a blended portfolio of fixed and variable mortgages to gain reduced interest rates while allowing flexibility in repayment.

4.2 Reduce Support Costs

The cost of supporting a decentralised desktop appears to be minimal as it is largely a self-support model that relies on the user to install their own applications and most problems are dealt with by

wiping and rebuilding the device. However, when a mass change is required, such as an OS upgrade (e.g. from Windows 7 to 8.1 or 10), the cost can be far higher than a centralised model due to the need for an individual visit to every device.

In addition, as noted in the 'wipe and rebuild' support model, a decentralised model is often very expensive to run if the end user expectation is still that an issue is resolved by IT, regardless of whether IT installed or approved the change. Such incidents can often take considerable time and effort to resolve, as well as time required with the client to establish the chain of actions which caused the incident. Scheduling and re-scheduling time can cause significant frustration and loss of productivity for both parties.

GoDaaS reduces both issues by using a remote management solution that allows for desktops to be regularly patched as well as remotely controlled for resolving issues on-line with the end-user. Where possible, this will be the first point of action for Fujitsu's GoDaaS service desk. If a desktop does need to be rebuilt, the centralisation of data and the storage of the users personalisation configuration also assists with rebuild activities, again reducing cost to resolve and improving end user productivity.

4.3 Desktop TCO Model

When comparing the cost of a virtual desktop with a managed traditional desktop, one cost seems higher to the other. However, to really understand the cost of each desktop type, the total cost of the desktop must be considered. This can include;

- Use of concurrent virtual desktops - instead of paying for a desktop per user, the institute can pay for a pool which is then consumed as people require a desktop but do not count where they do not. We have seen a volume of up to 50% less concurrent desktops to people who can access them rather than the one-to-one requirement for traditional or dedicated virtual desktops;
- Choice of hardware with thin clients and lower end laptop/tablets such as Chromebooks and iPads not requiring expensive OS licenses to run, makes the cost of devices to run virtual desktops cheaper than traditional desktop devices. This then balances the slightly higher cost of virtual desktops;
- Selecting low-cost hardware can also reduce hardware support costs with devices becoming 'consumables' i.e. they are swapped out by courier and the user and then only repaired if easy, with the cost of additional spares being cheaper than warranty and maintenance costs; and
- Standardisation of desktops and control on software that can be downloaded reduces support calls and prevents additional downtime for the end-user. In particular, virtual desktops, due to the centralised and standardised nature of their image, are much easier and quicker to resolve over traditional - again leading to better productivity for end users as well as reduced support costs.

It is evaluating and understanding all these factors that can provides a balanced view of true Total Cost of Ownership of desktops, and where the best cost efficiencies can be made.

4.4 Reduce Software Licensing

While some applications are covered by an enterprise (or campus) licence that allows unlimited deployment within an environment, many applications are still licenced on a per device basis. In a traditional fat-client model the applications are installed on the device when the user requests it, but very rarely are they removed / de-licensed when the user no longer needs it, or when the device is moved to a different user. This lack of software harvesting often leaves organisations carrying far more licences than they are actually using.

A Tertiary Education Institute may benefit from the use of published applications to reduce software licence wastage. By delivering the applications virtually as a published app there is no software installed on the device, therefore no risk of software wastage or unexpected compliance costs through uncontrolled use.

4.5 Cost Modelling Scenarios

Four suggested cost scenarios are proposed to enable a comparison of GoDaaS operational costs to the traditional CapEx/project investment. These scenarios are:

- Refresh / Establishment of a physical Lab versus virtual lab. Compare the TCO of building a physical computer lab (by physical we mean it includes the property cost of the actual room which is a considerable factor) and fitting with normal desktops, versus delivery of a course via a virtual lab using virtual desktops and the student's own devices/premises.
- Refresh / Establishment of a high-end workstation Lab. Compare the TCO of refreshing the high-end 3D workstations in a lab versus converting the aging workstations into thin-clients and delivering the course via virtual desktops with a GPU enabled Citrix farm.
- Refresh of corporate Desktops. Compare the TCO of refreshing a group of corporate PCs with virtual desktops delivered via new thin-clients or converting the aging desktops into thin-clients
- OS or Applications upgrade across large number of desktops. Compare the TCO of a project to upgrade the OS from Windows 7 to Windows 10 across a 100 devices in a traditional decentralised model, versus a virtualised desktop model.

Next steps

If you would like to discuss GoDaaS in more detail, arrange a face to face meeting or see a demonstration of the solution, please contact Tristan Faint, Fujitsu New Zealand Business Development Manager on the following…

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