

Accessibility of the Sun Ray Thin Clients

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Executive Summary

BUCS has rolled out the Sun Ray Thin Clients to increase access to computers on campus [4], these machines present a menu from which a user can choose to check webmail, browse the web or login to Microsoft Windows, Linux or Unix.

We would like to make four proposals. The first proposal is to make some changes to the menu system used on the Thin Clients so as to enable most students and visitors to log in to the systems. The remaining three proposals involve changes or additions to three of the systems available from the menu to help ensure access for the widest group of users.

Proposal 1: access to the menu

The current menu system does not provide keyboard interaction or keyboard shortcuts, facilities to change the text size or audio feedback to the user.

We propose, as a minimum, that there are clear keyboard shortcuts for all menu items and a user should be able to use the keyboard arrow keys to traverse the menu. Options to change the font size and audio feedback would further assist some users.

Proposal 2: access to web browsing

The web browser provided can be used both by staff and students of the university but also by some guests. To ensure that the largest group of users can access this system it is suggested that some minor changes are made to the web browser and the interface. We also suggest a welcome screen which guides users to set up the system to their requirements.

Proposal 3: access to Windows

Most site licences for assistive technology for Windows are too expensive to be rolled out across all public access machines however BUCS might consider installation of freely available alternatives. We propose that the freely available NVDA [14] screenreader is made available on the system. Should this be successful we suggest that BUCS consider other freely available assistive technology options.

Proposal 4: access to Linux

We propose that the available assistive software and settings for Linux should be enabled on the Thin Clients, this would expand public access provision for students who currently have a limited number of machines available to them for use during the university day. This expansion of provision could be broken into three stages:

1. Installation of software
2. Brief documentation provided on the BUCS wiki.
3. Helpdesk support and full documentation provided.

1 Introduction

As noted by BUCS [4] contention for access to computers on campus is high and BUCS is committed to increasing provision for students to use for coursework and for visitors to gain access to the Internet. One method BUCS has employed is the Sun Ray Thin Clients, these machines present a menu from which a user can choose to check webmail, browse the web or login to Microsoft Windows, Linux or Unix. The Windows option is like logging on to a standard BUCS public access PC.

Unfortunately the current menu interface for the Thin Clients is not accessible for users who cannot use a mouse or who cannot clearly read the screen. This has the effect of artificially reducing the number of public access machines available as the systems that can be chosen from the menu may themselves still be accessible with certain adjustments. An example might be a confident Windows user who cannot use a mouse. While the Windows system contains settings and keyboard shortcuts to enable the user to access the system they would not be able to select the Windows option in the Thin Client menu. Our first proposal is to make some changes to the menu system so as to enable most students and visitors to make selections.

Further to this key proposal we would like to propose changes to three of the systems available from the menu to ensure access to public access machines for the widest group of users. These proposals take advantage of freely available assistive software and settings already present in the systems themselves. While the proposed changes can not replace the highly specialist software/hardware available in the Assistive Technology room they will

provide additional resources for the approximately 7% [23, 24] of students with disabilities. In addition to this the changes will enable provision for a wider group of guests to the university and will allow all users to make adaptations such as font changes. This will have the effect of improving the usability and accessibility of computing facilities on campus — enhancing the external accessibility standing of the university.

Before expanding on the four proposals we present summary user profiles. We then specify the proposed changes. We are not party to the full technical specifications of the current system and hence this should be considered a working document. We hope that BUCS will accept the key objectives or assist us in altering them in the light of technical information. References to all software, websites and publications are provided.

2 Summary user profiles

The proposed changes will enhance or enable access for a variety of users, summary user profiles are presented.

Blind and low vision users

Users may need to **configure the desktop** to be easy to read, this might include changes to the text size and spacing, fonts and icon sizes or use of a high contrast or simplified theme. Some users might use **magnification software** to enlarge parts of the screen, assist with pointer control, change colours, brightness and contrast. A **screen reader** might be used to make some or all text information available as **speech and/or Braille**. Tasks requiring hand-eye coordination might be more difficult so the user might make **limited or no use of the mouse** when interacting with the desktop. Information which is displayed for a short period of time or unexpected changes to small parts of the screen might be missed.

Neurodiversity

Users may process information most efficiently in a variety of ways. Users may need to **configure the desktop** to suit their preferences which might include the use of simplified desktops, visually rich desktops, font, size, colour, sound and animation changes. Software which provides audio-visual reinforcement such as use of a **screen reader** with simultaneous highlighting for reading extensive pieces of text might be useful for some users. Multi-modal tools for gathering, organising, prioritising and overviewing information such as **mind mapping** software or **note taking applications** can be useful. Software to support time planning in different ways such as **calendars, reminders** and **time tracking** tools might be important. Users should be able to plug in digital recording devices and **play back common sound and video formats**. Access to a variety of proof reading tools including **dictionaries, thesauri, spell check** and **homophone checks** with audio-visual reinforcement might be preferred.

All users can benefit from accessing information in a mixture of modalities depending on their preferred learning styles.

Visual stress, colour blindness and eye strain

Users may need to **configure the desktop** to be easy to read, this might include changes to the text size and spacing, fonts or using colour changes. Symptoms of visual stress are alleviated by use of **screen masking** with a coloured overlay while users who are colour blind may need to alter the colour of text or backgrounds. The use of **screen rulers** can assist tracking on the screen. Some users will find that the use of a **screen reader** for extensive pieces of text, perhaps with simultaneous highlighting of text, improves reading speed.

All users can benefit from controlling their desktop environment to ensure visual comfort to help combat eye strain.

Alternative input

Alternative input mechanisms range from minor changes to mouse or keyboard settings, input using mouse only or keyboard only or use of alternative hardware:

- Alternative keyboard settings: users may need **sticky keys**, to control the **repeat rate** or **ignore brief presses or duplicates**. Users may want **audio feedback** on key presses either alone or alongside screen reading, others may need to alter the **cursor size and blink**.
- Alternative mouse settings: left-handed users may prefer to change the **mouse orientation**. All users may need to alter the settings for **double click timing**, **pointer movement** and **drag and drop** and some users may benefit from generated clicks on **button hold** or **mouse dwell**. Users who find it difficult to locate the mouse pointer may wish to control the size and colour as well as turning on **pointer location**.
- Keyboard only input: Some users have limited use of pointing devices such as a mouse and may provide input using the keyboard alone. Clear documentation of **keyboard shortcuts** can increase efficiency. **Keyboard controlled mouse movement** either provided by the system or a screen reader may be required for some applications but this can be inefficient.
- Mouse only input: Some users have limited use of the keyboard and may provide input using the mouse alone. On screen keyboards or other **pointer only text input** mechanisms are required.
- Alternative hardware: Some users may need to plug in alternative hardware to provide input [6, 7]

All users can benefit from controlling their input mechanisms to ensure comfort to help combat repetitive strain injuries. Users with temporary conditions (e.g. a broken arm) may need to alter their settings for short periods of time.

3 Proposed changes to the Sun Ray Thin Client set up

For some students the Windows and Linux systems which can be accessed via the menu are accessible and usable providing they can configure their desktop, keyboard and pointer preferences and these settings can be saved. BUCS might consider providing configuration assistance on the Web and at the helpdesk.

The menu system, which has a generic configuration and poor interfaces is itself a barrier. We propose changes which should be made to the menu system.

For other students the systems currently provided may still be inaccessible or inefficient to use and we make three further proposals which could improve access. All these assume that the menu system has been made accessible.

3.1 Access to the menu

The current menu system does not provide:

- keyboard interaction or keyboard shortcuts for the menu items
- facilities to change the text size in the menu
- audio feedback to the user

We propose, as a minimum, that there are clear keyboard shortcuts for all menu items and a user should be able to use the keyboard arrow keys to traverse the menu. To ensure access for some users by this mechanism, without audio feedback, this keyboard interface to the menu should not wrap round. This allows users who cannot use a mouse or who require changes to mouse settings/assistive software to use a mouse to access the menu. It will also allow users who are used to the system but who cannot clearly read the text to select the item they require.

An option (and appropriate keyboard shortcuts) to increase/decrease the font size would further assist some users. To assist users who are new to the system and who cannot read the screen clearly audio feedback for navigation and key presses would be ideal.

3.2 Access to web browsing

The web browser provided can be used both by staff and students of the university but also by some guests. To ensure that the largest group of users can access this system, as well as the changes to the Thin Client menu in proposal 1, it is suggested that some minor changes are made to the web browser and the interface. We also suggest a welcome screen which can guide users to set up the system to their requirements.

The system allows the user access to the Firefox web browser only. By ensuring that all standard keyboard shortcuts function and the appropriate access preferences are highlighted it should be possible to use the browser without the mouse.

It is proposed that when a user accesses the web browser option they are presented with an instruction page which assists them in setting appropriate font, font size, colour and accessibility settings. Keyboard shortcuts for changing the zoom of the page can also be highlighted at this time. To further assist users the font size in the Firefox menus should either be increased by default or be under the control of the user as should the size and colour of the mouse pointer. All settings should be saved for future sessions.

Providing the JISC TechDis toolbar [13] will allow users who can use a mouse to customise interaction with web pages including font, colour and spacing. As well as changing how the web page is presented the toolbar offers a spell check, dictionary and citation assistance and provides the facility to read text aloud. The lite version of the toolbar can be made available as a shortcut link with no installation required.

3.3 Access to Windows

To ensure that Windows is available to the largest group of students on these machines the Thin Client menu would need to be accessible (proposal 1). Most site licences for assistive technology for Windows are too expensive to be rolled out across all public access machines however BUCS might consider installation of freely available alternatives both on the Thin Clients and across all public access PCs.

We propose that the freely available NVDA [14] screenreader is made available on the system. This would allow confident Windows users who do not wish to use Linux but who require a screen reader to access a large number of BUCS machines. BUCS might use this opportunity to install freely available assistive technology across the site as a trial for further accessibility improvements. NVDA is an appropriate choice for this trial as the developers are well funded, can provide advice and quick turn around for enhancements which might be necessary for integration into public access systems.

Should this trial prove to be successful we would like to suggest that BUCS investigate other freely available assistive technology options for their windows systems [12]

3.4 Access to Linux

The Linux system has a small but growing, freely available, collection of assistive software and settings which can be used to enable access to the system. We propose that the available assistive software and settings should be enabled on the Thin Clients, this would expand public access provision for students who currently have a limited number of machines available to them for use during the university day. This expansion of provision could be broken into three stages:

1. The Thin Client Linux system is brought up to date and the relevant software installed. The current system is not capable of running some of the assistive software.
2. Brief documentation of the available assistive software and settings is made available, perhaps on the BUCS wiki.
3. Helpdesk support and full documentation for the assistive software and settings, drawing on and linking to accessibility documentation already available for the Linux system, is provided.

3.4.1 Software list

- **Orca** [16]: provides screen reading with speech output (via Speech Dispatcher) and Braille output (via BRLTTY) and screen magnification. Orca can also provide colour screen masking with no magnification. Future directions of this project will include screen reading support more suitable for users with dyslexia. Orca requires a recent version of Firefox e.g 3.6 and other programs [17] to function.
- **Speech Dispatcher** [19]: provides text to speech, used by Orca.
- **BRLTTY** [3]: provides Braille support, used by Orca.
- **On screen keyboards** [15, 10]: for instance, OnBoard is an on screen keyboard for pointer-only users; it is available out of the box in Ubuntu and is available during login, and the desktop session. Alternatives are available.

- **Dasher** [5]: on screen pointer only text input
- **FreeMind** [8]: mind mapping software
- **TomBoy** [20]: assistance with organising ideas and information. Automatically links information together. Add-ons include a visual output of linked notes, pop-up reminder notes and a Firefox add-on to assist with researching information on the web [22, 21].
- **Hamster** [11]: enables users to keep track of their activities on the computer useful for focusing attention as provides current task reminders and time use overview.
- **Screen ruler** [18]: can be used to help tracking on the screen.
- **JISC Techdis Toolbar** [13]: helps customise interaction with web pages for users who can use a mouse including font, colour and spacing; offers a spell check, dictionary and citation assistance and provides the facility to read text aloud. Requires Firefox 3.
- **Adobe Reader** [2]: recent Linux versions allow PDF documents to be re-flowed for larger font sizes and read aloud.
- **Assistive technology preferences**: allows alteration of various settings e.g. sticky keys, mouse dwelling etc.
- **Display preferences**: allows choice of high contrast themes, larger fonts across the whole system etc.
- **Sound preferences**: allows a visual alert when system sounds are played

3.4.2 Technical requirements

The current Linux system is not capable of running some of the assistive software, beyond this, some software on the system must be of a minimum version number to function with the assistive software.

- Currently the sound does not function on the Linux system, this would need to be remedied.
- Using the accessible login prompt should be considered.
- For Orca and the JISC TechDis toolbar to function a recent version of Firefox is required. Other software should also be upgraded to more recent versions [17].
- Many USB keyboards, mice and digital recording devices will work if plugged in though this should be tested. To enable a user to plug in a USB Braille display BRLTTY would need to be started by default (some Debian based systems have been known to enable BRLTTY by default so we expect this to work and not cause any problems).
- Users should be able to set and save accessibility settings including keyboard, mouse, font, display etc.

BUCS is investigating [4] the purchase of further Sun Ray Thin Clients. Should the technical requirements be such that no headway can be made on the above proposals it may be worthwhile contacting Oracle to attempt to resolve them. A useful contact we have for accessibility advice and guidance is Peter Korn, Accessibility Principle at Oracle and AEGIS [1] Technical Manager.

References

- [1] AEGIS, <http://www.aegis-project.eu/>
- [2] Adobe Reader, <http://www.adobe.com/accessibility/products/reader/>
- [3] BRLTTY, <http://mielke.cc/brlTTY/>
- [4] Bath University Computer Services, *Thin client technology (Sun Rays)*, <http://www.bath.ac.uk/bucs/services/pacs/sunrays.html>
- [5] Dasher, <http://www.inference.phy.cam.ac.uk/dasher/SpecialNeeds.html>
- [6] EmpTech, *Keyboard related*, http://www.emptech.info/categories_list.php#c8
- [7] EmpTech, *Mouse related*, http://www.emptech.info/categories_list.php#c11
- [8] FreeMind, http://freemind.sourceforge.net/wiki/index.php/Main_Page
- [9] Gnome, *Project list*, <http://projects.gnome.org/>
- [10] Gnome On-screen Keyboard (Gok), <http://www.gok.ca/>
- [11] Project Hamster, *The Gnome Time Tracker*, <http://projecthamster.wordpress.com/about/>
- [12] JISC TechDis, *Assistive Technologies — The Untapped Potentials*, <http://www.techdis.ac.uk/getfreesoftware>
- [13] JISC TechDis Toolbar, <http://access.ecs.soton.ac.uk/ToolBar/>
- [14] NVDA, <http://www.nvda-project.org/>
- [15] OnBoard, <https://wiki.ubuntu.com/Accessibility/Projects/onBoard>
- [16] Orca, <http://live.gnome.org/Orca>
- [17] Orca, *Accessible Applications*, <http://live.gnome.org/Orca/AccessibleApps>
- [18] ScreenRuler, <http://linux.softpedia.com/get/Desktop-Environment/Tools/Gnome-Screen-Ruler-3685.shtml>
- [19] Speech Dispatcher, <http://www.freebsoft.org/speechd>
- [20] Tomboy, <http://projects.gnome.org/tomboy/>
- [21] Tomboy add-ins, <http://live.gnome.org/Tomboy/PluginList>
- [22] TomFox, <https://addons.mozilla.org/en-US/firefox/addon/8276/>
- [23] University of Bath, *Provision and Evaluation of Practice (Students)*, section 6.16 of *Disability Equality Scheme* <http://www.bath.ac.uk/vc/equalitydocs/disabilityequality.html>
- [24] University of Bath, *Disability Equality 2009-2012 in Single Equality Scheme and Action Plan (2009)*, University of Bath, www.bath.ac.uk/about/equalities/singleequalityscheme.pdf