Desktop Multiplier Readme

Userful®'s Desktop Multiplier® Multi-Station Software System

Version 3.0-12

Introduction

Desktop Multiplier® is a set of standard Linux software packages that extend the X Window System to support up to 10 fully independent and concurrent workstations using a single computer box. This is accomplished by adding standard video cards, USB keyboards and mice to a single PC system and installing Userful's software. Desktop Multiplier is compatible with all single and dual-headed video cards supported by X.Org/XFree86 and has been tested on most major 2.6 kernel Linux distributions (see "Supported Linux Distributions" below for details).

Desktop Multiplier is delivered as a single zip file containing either a .RPM or .DEB package and supports a variety of Linux distributions.

Utilities package

This package includes programs, scripts and config files for system configuration, keyboard/mouse assignment and device hot-plug capabilities. Files are named:

- `1box-utils-k26-<version>.i386.rpm` (For RPM package-based systems)
- `1box-utils-k26-<version>.i386.deb` (For DEB package-based systems)

Multi-station X server package

This package contains the Userful Multi-Station X-Server, which supports multiple simultaneous local users. Files are named:

- `1box-server-xorg-<version>.i386.rpm` (For RPM package based systems)
- `1box-server-xorg-<version>.i386.deb` (For DEB package based systems)

Dual View Functionality

Desktop Multiplier's Dual View functionality enables each station to support up to five users, with each user having an individual desktop workspace that spans two monitors. You can configure monitors to use Dual View during the Desktop Multiplier installation process. Note that the two monitors that display a Dual View desktop must be connected to the same video card.

Trial Version

Desktop Multiplier will operate as a trial version until you purchase an appropriate license for your Userful system. You may purchase a multi-station license from your Userful representative or from Userful.com – see the Licensing section below for details.

Limitations of Trial Version: The Desktop Multiplier trial software supports up to 10 concurrent stations (depending on your specific hardware) and will typically display a brief registration reminder on all attached screens every 20 minutes or so.

Requirements for Desktop Multiplier

Hardware Requirements

- **Hard Disk**
    - Installation: 13 MB
    - Running: 13 MB
- **Processor**
    - 400 MHz processor or better
- **Memory**
    - Minimum: 192 MB
    - Recommended: 256 MB for two stations
    - 64 MB for each additional station on multi-station installations

Supported Linux Distributions

Desktop Multiplier supports most Linux distributions running kernel version 2.6 or greater. If you do not have Linux installed, please either download one of the supported Linux distributions or download our complete Desktop Server™ solution (from http://userful.com/download/dl?p=ds), which delivers a reference platform already integrated with the multi-station functionality.

The following Linux distributions are currently supported:

- **RPM Based Distributions**
    - Fedora Core 2, 3, 4, 6
    - SuSE 9.1, 9.3, 10.1
    - SLED 10
    - NLD (Novell Linux Desktop) 9
    - Mandriva (Mandrake) 10.0, 10.1
    - Red Hat Enterprise Linux WS 4
    - CentOS 4

- **DEB Based Distributions**
    - Ubuntu 5.04, 5.10, 6.06, 6.10, 7.04
    - Kubuntu 6.10, 7.04
    - Edubuntu 6.10
    - Linspire 5.0
    - Freespire 1.0.4
    - Xandros 3.0, 4.0
    - Debian 3.1 (Sarge)

- Dreamlinux 0.5-pre5
- SimplyMepis 6.5
- PioneerLinux

- See also Instructions for Other Distros

NOTE: Desktop Multiplier may work with other Linux distributions that use the Linux 2.6 kernel, however distributions other than those listed above are not officially supported by Userful at this time. Instructions for installing Desktop Multiplier on a non-supported distribution are available at http://userful.com/products/dm-config. Official support for additional Linux distributions will be available in future versions of this software. Please address specific requests for supporting an additional Linux distribution via email to partner@userful.com.

Note for Debian 3.1 (Sarge): Debian Sarge uses the Linux 2.4 kernel by default with new installations. You must upgrade your Linux kernel to a 2.6 based kernel before installing Desktop Multiplier.

The Control Panel
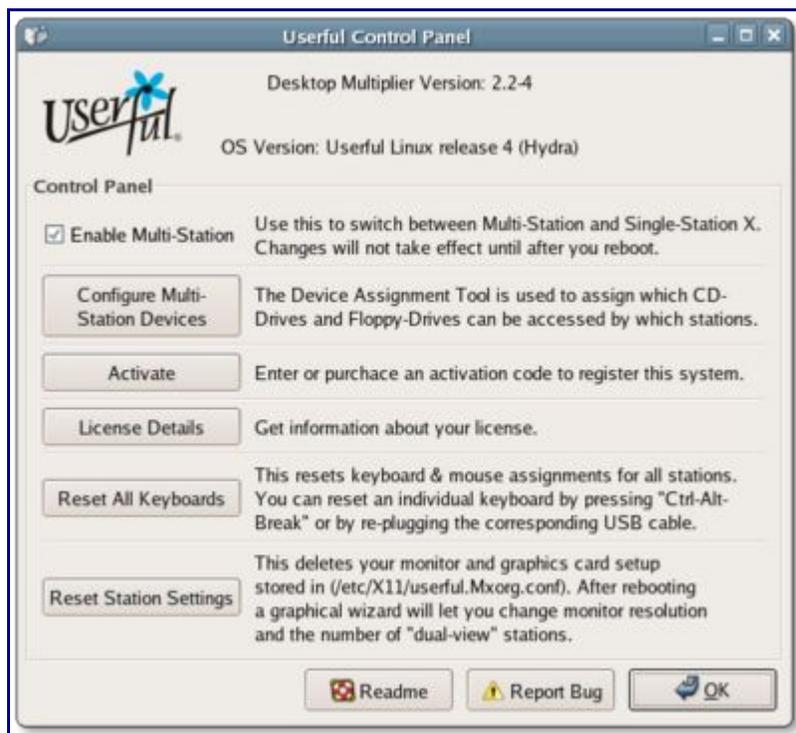
This software comes with a graphical interface to control various aspects of Desktop Multiplier. This Control Panel can be launched from the icon labeled "Userful". This icon can be found in the main menu of most distributions. The actual location varies between distributions, but is usually in "Accessories" or "System Tools". The Python Gtk module is required to use this interface. This module is available on most distributions and is called "python-gtk". It is installed by default on Fedora Core, Ubuntu and Mandrake. On some distributions, such as Novell Linux Desktop 9, the module is only installed when the Gnome desktop is chosen as the default desktop during installation.

- The location of the menu entry varies depending on your distribution.

    - **Desktop Server/Fedora/Redhat/Ubuntu:** Applications > System Tools > Userful
    - **Suse:** Applications > Utilities > More Programs > Userful
    - **NLD:** Applications > Accessories > More > Userful

- Click `Install License`: This will take you to a web page to get a license.
- Note: If `Userful` does not appear as a graphical menu entry in the locations listed above, the Userful dialog can be launched from the command line using:

    ```
    $ /usr/share/lbox-utils/about-dialog.py
    ```

Additional Hardware

Desktop Multiplier supports the following optional hardware components:

- Maximum five dual head video cards
- Up to 10 USB keyboards, mice and optional extension cables
- 10 monitors and optional extension cables and adapters
- USB hubs to support devices (powered hubs are strongly recommended)

Choosing a Graphics Card

Desktop Multiplier is designed to support all single and dual-headed video cards, supported by X.Org/XFree86. Any video card combinations where you can start X in multi-headed mode (i.e. multi-monitor, multi-display) should work with Desktop Multiplier. Xinerama extensions are not used, so any standard single-head or multi-head video card should work.

We recommend disabling on-board video in the BIOS if your motherboard includes an on-board video chipset. If the on-board video is not disabled, boot messages will be displayed on that video output. If no monitor is connected to the on-board video output, these boot messages will not be visible. The on-board video may be able to support a workstation depending on the model and revision of your motherboard.

Note: Although heterogeneous (mixed) combinations do often work, to ensure a simple and manageable computing environment, we recommend using a consistent model and revision of graphics cards and monitors for your Desktop Multiplier system. We suggest searching the following third-party database for heterogeneous graphics card combinations that should work under Linux:

- http://www.realtimesoft.com/multimon/search.asp

Userful supports and recommends the following low cost single chip, dual head chipsets, which are available as AGP, PCI or PCI-E cards from a variety of manufacturers:

- ATi Radeon 7000, 7500, 9000, 9200, 9250 series and X300, X550.
- Matrox G400, G450, G550 (see Note below)
- NVIDIA GeForce MX 440, FX5200 and 6600 GT. Quadro FX 500/600 (see Note below)

Typically a 10 station system with one monitor each can be built using five dual head video cards.

Note: The default "mga/nv" display drivers included with X.Org/XFree86 do not provide adequate multi-head support. To use dual head Matrox or NVIDIA video cards, download the latest versions of these drivers from the following sites:

- http://www.matrox.com/mga/support/drivers/latest/home.cfm
- http://www.nvidia.com/content/drivers/drivers.asp

Supported Video Cards for Dual View

The following video cards have been successfully tested with Dual View in our lab. Note that the Dual View is only supported on ATI and NVIDIA cards at this time. If you require Dual View support for specific ATI/NVIDIA cards not in the list, please contact us at: 1-866-USERFUL (873-7385).

- ATI - Radeon 7000, 7500, 9200, 9250, X300, X550
- NVIDIA - GeForce MX440, FX5200, 6600 (PCIE) and Quadro FX 500/600

Installing Desktop Multiplier

Requirements

Prior to installing Desktop Multiplier on your existing Linux system, you will need to add enough video cards and USB ports to provide a video head for each station. We recommend using USB keyboards with an integrated USB hub to easily connect each station's mouse (and other USB devices) to minimize the number of devices connected to the central system. If a USB hub is required, be sure to use a powered hub. Non-powered hubs may not provide sufficient power for all connected devices. Similarly, if you need to use extension cables ensure that the distance between the keyboard or other USB device and the computer/powered hub is not greater than 3 m (10 ft).

Note: If you are not currently running a Desktop Multiplier supported Linux distribution, you can optionally download our Desktop Multiplier Desktop Server software (4 CD set), which provides a complete, multi-station Linux operating system (based on Fedora Core).

Installation Process

To install Desktop Multiplier follow these steps:

Step 1: Download the latest software from http://userful.com/download/

Step 2: Position one USB keyboard and mouse combination for each workstation.

- *(**Note:** the built-in system PS/2 keyboard and mouse connections can be used to connect one station.*)
- Connect all cables to the back of the computer where you have installed the Desktop Multiplier software, including Ethernet, monitors, USB keyboards and mice, printers, etc.
- Power on all monitors and then turn on the multiplier computer.

Step 3: Unzip the demo software on the target computer.

```
$ unzip Desktop-Multiplier.zip
```

Step 4: Run the INSTALL script as "root".

```
$ bash INSTALL
```

- The INSTALL script will **not** overwrite existing X.Org/XFree86 configuration files. Optionally, you can install the Desktop Multiplier software manually. To install the Desktop Multiplier demo, run the following commands as "root":
- For RPM based systems:

```
$ rpm -Uvh 1box-utils-k26-.i386.rpm
$ rpm -Uvh 1box-server-xorg-.i386.rpm
```

- For DEB package based systems:

```
$ dpkg -i 1box-utils-k26-.i386.deb
$ dpkg -i 1box-server-xorg-.i386.deb
```

After the Desktop Multiplier demo software installation has completed, you will need to reboot the computer to begin the automated configuration process and enable your additional stations.

Uninstalling Desktop Multiplier software from your system should fully restore the original system configuration. See Uninstallation Procedure below for details.

Installing on Linspire

Desktop Multiplier software is currently not compatible with LDM (the default display manager in Linspire Linux). Because Linspire does not provide any display management packages other than LDM, you will need to install the GDM package from the standard Debian repository before installing Desktop Multiplier software on your Linspire system.

Installing GDM on Linspire:

Step 1: Uncomment the last two lines in the `/etc/apt/sources.list` file to install packages from the standard Debian distribution.

Step 2: Update the package index file.

```
$ apt-get update
```

Step 3: Install GDM package.

```
$ apt-get install gdm
```

Step 4: Continue with the normal installation process as described above under "Installation Process".

Note: Be sure to create a Guest user before installing Desktop Multiplier as it disables the root login. You can also refer to your OS guide for enabling root login.

The next time the computer boots after installing the software, the Desktop Multiplier system will automatically detect your video cards. After it detects your video cards, you will be promoted to assign monitors for use with Desktop Multiplier's Dual ViewView functionality. An on-screen wizard will guide you through the process and generate the required multi-user configuration files, after which the system may reboot for the changes to take effect.

Installing on Freespire

Desktop Multiplier software is currently not compatible with LDM (the default display manager in Linspire Linux). You will need to install the GDM package before installing Desktop Multiplier software on your Freespire system.

Installing GDM on Freespire:

Step 1: Update the package index file.

```
$ apt-get update
```

Step 2: Install GDM package.

```
$ apt-get install gdm
```

Step 3: Continue with the normal installation process as described above, under the heading "Installation Process".

The next time the computer boots after installing the software, the Desktop Multiplier system will automatically detect your video cards. After it detects your video cards, you will be promoted to assign monitors for use with Desktop Multiplier's Dual View functionality. An on-screen wizard will guide you through the process and generate the required multi-user configuration files, after which the system may reboot for the changes to take effect.

Recommended BIOS settings

- Enable all USB ports
- Enable Legacy USB support. (Sometimes called "USB keyboard support"), otherwise only the PS/2 keyboard will work during the Linux boot process.* Disable unnecessary integrated peripherals. Installing extra video cards increases strain on the PCI bus. Disabling any unneeded devices (e.g., serial ports, parallel ports, etc.,) in the BIOS can improve performance and compatibility.
- Disable on-board video (see notes above)

Setting Screen Resolution

The first time Desktop Multiplier starts, a text mode configuration tool enables you to set screen resolutions. If you need to change the screen resolutions at a later time, delete the /etc/X11/userful.Mxorg.conf file and restart X. The text mode configuration tool will once again activate, enabling you to set a new screen resolution, and create a new userful.Mxorg.conf file. Desktop Multiplier supports resolutions of 640x480, 800x600, 1024x768 and 1280x1024.

Assigning keyboards and mice

Once the system has started, each workstation display will prompt you to press a function key (F-1 through F-10) on the keyboard in front of the monitor in order to link the correct keyboard to the specific monitor. Both a keyboard and a mouse are required in order to create a station. If the mouse is plugged into the USB keyboard (via an integrated hub in the keyboard) the mouse will be automatically assigned along with the keyboard when you press the correct function key. If you have the mouse plugged into a separate USB port, you will be prompted to press a button on the mouse in order to link it with the correct monitor and keyboard combination.

After setting up mice and keyboards, you may login to your desktop normally.

You may reassign keyboards and mice at any point by simply pressing the Ctrl-Alt-Break key combination or re-connecting the device by unplugging and re-connecting it to the USB port while the system is running. The assignment screen will automatically appear on top of your current desktop. No work will be lost, simply press the correct F-key and return to your desktop.

Note: You can identify unassigned keyboards by examining their LEDs. The LEDs on a unassigned keyboard will blink until the keyboard is assigned to a station.

Warning: Logging in concurrently to more than one station as the same user is not advised. It can cause unintended consequences to your system (e.g. corruption of your user settings). Most Linux distributions will warn you if you attempt to login as the same user on more than one station simultaneously. The screen will display a warning message such as "this user is already currently logged-in to the system".

Touch Screen Support and Calibration

Supported TouchScreen Devices

- MicroTouch (3M) USB TouchScreen
  - Vendor ID: 0x0596, Product ID: 0x0001
- Elo TouchSystems TouchScreen
  - Vendor ID: 0x04e7, Product ID: 0x0020
  - Vendor ID: 0x04e7, Product ID: 0x0050

Note: If your touchscreen device is not in this list, it may still work. You need to edit the config file `/etc/X11/userful.Nxorg.conf`.

Calibration

The touch screen calibration wizard assumes all touch screens connected to the computer are of the same make and model.

Before starting the calibration procedure, all touch screens must be connected to the computer and powered on. If touch screens will not be used for all stations, make sure that a touch screen is connected to the first video head. The touch screen calibration tool will use the touch screen connected to the first video head as the basis for configuring all other touch screens connected to the computer.

Refer to the main Desktop Multiplier readme to identify the location of the first video head on the computer.

On the first boot after installing Desktop Multiplier, you will be prompted to press "`F1`" on the first video head to start the calibration procedure. Only an "X" icon is displayed on the other heads.

When you are prompted to press "`F1`", press the "`F1`" key on your keyboard and touch the touch screen connected to first head. This will link the keyboard and touch screen to the first video head.

Step 1 of 3: (Calibrate Screen Size)

In this step, touch the screen and drag your finger around the outermost edges of the screen.

Keep dragging your finger around the edges of the screen until the "Min" and "Max" value on the screen stop changing.

Step 2 of 3: (Align Touch Points)

This step fine-tunes the touch screen. Touch the red square as it appears in each of the 9 key points on the screen.

Step 3 of 3: (Verify Calibration)

This step verifies the current calibration. Touch the screen and drag your finger to confirm that the pointer follows your finger.

Press "Y" on your keyboard to accept current calibration, or press "N"if the cursor does not follow your finger.

Horizontal (X-axis) Test (Optional)

Drag your finger horizontally across the screen.

- Press "Y" on your keyboard if the pointer follows your finger, or
- press "N" to flip the X-axis.

Vertical (Y-axis) Test (Optional)

Drag your finger vertically up and down the screen.

- Press "Y" on your keyboard if the pointer follows your finger, or
- press "N" to flip the Y-axis.

This concludes the touch-screen calibration process. If you wish to recalibrate the touch screens at a later date, you may do so by deleting the /etc/X11/userful.Mxorg.conf file.

Licensing Desktop Multiplier

To enable the full version of Userful's Desktop Multiplier software, you need to purchase a valid license for the desired number of stations on each computer that you run Userful software. This may be done through an automated registration process by clicking the "Userful" menu choice (typically located under the "Applications – System Tools" menu tree) and following the instructions, or by contacting your Userful representative who can assist you and optionally send you a license by email. Once you receive your emailed license, you must then manually copy the purchased license file "##:##:##:##:##:##.1box.info" or just "1box.info" into the /etc/X11 folder on your Linux system and restart the computer.

Note: This license file is typically unique to the MAC address of the specific system it is deployed on and will not work on any other system.For other licensing scenarios and options please contact your authorized Userful reseller or a Userful representative.

Using Desktop Multiplier

Special Key Combinations

Two useful key combinations are available to users:

- **Ctrl-Alt-Backspace**

    This key combination resets the current station, returning it to the login screen.

- **Ctrl-Alt-Break**

    Pressing this key combination on a keyboard unlinks the keyboard (and any connected mice) from the station to which it was assigned. Once the link is broken, the station to which it was formerly assigned will prompt for the assignment of a keyboard.

Toggling Between Regular X and Multi-Station X

You can toggle between the regular X and multi-station X by updating /etc/sysconfig/xtype, Set the "XTYPE" to "MULTI" or "SINGLE" to enable multi-station X, or regular X, respectively. The change will take effect from next reboot.

- **For multi-station X:**

    XTYPE=MULTI

- **For regular X:**

    XTYPE=SINGLE

Blacklist for Input Devices

You can make unwanted input devices stop working with Desktop Multiplier by adding them to the blacklist file `input-blacklist`. Any devices listed in this file will be ignored by Desktop Multiplier.

- **File Path:** `/etc/userful/input-blacklist`
- **Entry Format:** `Vendor_ID Product_ID Device_type "Description"`
- **Example:** You might add a line that looks like this:

    05D5 6782 2 "Super Gate Technology, built-in mouse"

- **Comments:** A line starting with # is treated as a comment. For example:

    # This is a comment

Multimedia and Storage Devices Support

Note: You need extra packages to support multimedia and storage devices with Desktop Multiplier. Please contact your Userful account representative to get the extra packages.

Multimedia and storage devices can be assigned to a station and operated independently with Desktop Multiplier by installing extra packages provided by Userful. Storage devices can optionally be shared by all stations.

Supported multimedia devices currently include audio devices, and supported storage devices include floppy, optical drives and flash memory.

Distro [edit]	Multimedia Devices	Storage Devices
Ubuntu 6.06, 6.10	Yes	--
Fedora 4	Yes	--
Fedora 6	Yes	Yes
openSuSE 10.1	Yes	Yes
SLED 10	Yes	Yes

Uninstall Procedure

To uninstall the Desktop Multiplier software, run the UNINSTALL script as "root"

```
$ bash UNINSTALL
```

Optionally, you can uninstall the Desktop Multiplier software manually. To manually uninstall Desktop Multiplier, run the following commands as "root".

For RPM based systems:

```
$ rpm -e 1box-utils-k26
$ rpm -e 1box-server-xorg
```

For DEB package based systems:

```
$ dpkg -r 1box-utils-k26
$ dpkg -r 1box-server-xorg
```

After uninstalling Desktop Multiplier, you will need to reboot the computer to return to the previous single-user Linux system configuration.

Known Limitations

(Inherent to simultaneous multi-station systems.)

Blank screen saver recommended

Some graphical screen savers can consume 99% of CPU resources. Since Desktop Multiplier software is a multi-user system and other users may be working, we highly recommend using only a blank screen or a very simple screen saver.

Homogeneous graphics chipsets recommended

While it is possible to support a heterogeneous mix of video chipsets within a single computer box, for example by mixing ATI, NVIDIA and Matrox cards, such a configuration is not recommended as it is not possible for us to directly test and support all possible combinations. Using multiple video cards and monitors that do not share all the same characteristics and X drivers creates additional and unnecessary complexity. Therefore, we recommend keeping your evaluation and production environments as simple as possible and using a single graphics chipset for all video cards within the Desktop Multiplier computer.

3D Acceleration not supported on multiple video cards

Using multiple and/or dual-headed video cards in Linux prevents software such as video games from using 3D acceleration properly. This is not a Desktop Multiplier specific issue, but a limitation of the Direct Rendering Infrastructure (DRI) within the current X-server system. XFree86 does not support DRI acceleration on multiple video cards. XFree86 extensions not dependent on DRI should work, for example 2D acceleration is supported.

VT switching

Switching between virtual terminals in X (`pressing Ctrl-Alt-F1`) is disabled by default in Userful's Desktop Multiplier multi-station system. This limitation prevents a user interfering with users working on other stations.

Reboot and shutdown permissions

Users should typically not have permission to shutdown or reboot a shared computer as this could interrupt other users. The display of "shutdown" and "reboot" options to the user and their functionality are controlled by the specific desktop environment's logout dialog and greeter. Examples follow:

- Logout dialog: Gnome offers only the "logout" option, however KDE presents reboot and shutdown options. However, in KDE, reboot or shutdown only takes effect after all users have logged out.

- Greeter: Both KDM and GDM offer shutdown and reboot options. With Desktop Multiplier, GDM will ignore the shutdown request, KDM behaves as above (shuts down after everyone has logged out).

RADEON 7000 with SMP kernel

Certain combinations of Linux distributions and motherboards have known issues with multiple RADEON 7000 cards using the 2.6 SMP (Symmetric Multi-Processing) Linux Kernel. If you are using SMP with RADEON 7000 and encounter problems, we recommend switching to a non SMP kernel. This is a bug with the RADEON driver and is not specific to Userful's software.

Boot messages only display on the primary video display

BIOS and Linux boot messages will only display on the primary video adapter. On some dual head cards this is two monitors, but for the most part it will only display on a single monitor. It is important to connect a monitor to this primary head to display these messages. On motherboards with on-board video (video hardware built into the motherboard), typically the BIOS will be set to use the on-board video head by default. We generally recommend that motherboard/main-board/on-board video be disabled in the BIOS forDesktop Multiplier systems.

CPU architecture support

This binary distribution only supports the x86 architecture. Contact us if you need support for additional architectures.

Multimedia keys on keyboards are not supported

Utilities that enable multimedia keys in Linux may not be reliable when multiple keyboards are connected to the system.

Additional keyboard map support

The kernel layout map for individual keyboards is ignored by Desktop Multiplier. Hence the X configuration and/or keyboard mappings created by hardware detection and configuration tools such as Kudzu are ignored. At the greeter screen, all keyboards are mapped to the default system language which is usually the language you selected when installing Linux. Most greeters allow login language selection and most desktop sessions (Gnome, KDE, etc) have tools to change keyboard layouts. Using a greeter to change language and keyboard layout selections behaves as expected.

XVidMode extension support

Single-chip dual-head ATI video cards are not compatible with the XVidMode extension. XVidMode extension is disabled on ATI video cards by default when using Desktop Multiplier.

Unstable USB 2 support in Linux Kernel

We recommend disabling USB 2 support (sometimes referred to as "Enhanced USB" or "High Speed USB") in the BIOS since the current USB 2 Kernel module is unstable under some circumstances. USB 2 devices may be used in Desktop Multiplier, but only at USB 1 speeds.

X crash or no output from second head of NVIDIA cards

Ensure a monitor is connected to each video head before turning on the computer, and optionally that the monitors are turned on. Some NVIDIA cards will not display to the second head if there is no monitor connected at boot time. Sometimes, it even causes the X crash.

System instability with NVIDIA driver

There is a known issue regarding system instability using NVIDIA video drivers with kernel 2.6.11-rc3 or lower. If you experience random reboot or kernel panics using the NVIDIA driver, please ensure that your kernel version is 2.6.11-rc3 or higher.

Kernel virtual address space exhaustion on the X86 platform with multiple NVIDIA cards

On X86 systems and AMD64/EM64T systems using X86 kernels, only 4GB of virtual address space are available, which the Linux kernel typically partitions such that user processes are allocated 3GB, the kernel itself 1GB. Part of the kernel's share is used to create a direct mapping of system memory (RAM). Depending on how much system memory is installed, the kernel virtual address space remaining for other uses varies in size and may be as small as 128MB, if 1GB of system memory (or more) are installed. By default, the kernel reserves a minimum of 128MB.

The kernel virtual address space still available after the creation of the direct system memory mapping is used by both the kernel and by drivers to map I/O resources, and for some memory allocations. Depending on the number of consumers and their respective requirements, the Linux kernel's virtual address space may be exhausted. Newer Linux kernels print an error message of the form shown below when this happens:

```
allocation failed: out of vmalloc space - use vmalloc=<size> to increase size.
```

The NVIDIA kernel module requires portions of the kernel's virtual address space for each GPU and for certain memory allocations. If no more than 128MB are available to the kernel and device drivers at boot time, the NVIDIA kernel module may be unable to initialize all GPUs, or fail memory allocations. This is not usually a problem with only 1 or 2 GPUs, however depending on the number of other drivers and their usage patterns, it can be; it is likely to be a problem with 3 or more GPUs.

Possible solutions for this problem include:

- If available, the 'vmalloc' kernel parameter can be used to increase the size of the kernel virtual address space reserved by the Linux kernel (the default is 128MB). It is recommended to raise this value in increments to find the best balance between the size of the kernel virtual address space made available and the size of the direct system memory mapping. You can achieve this by passing `'vmalloc=192M'`, `'vmalloc=256MB'`, `...`, to the kernel and checking if the above error message continues to be printed.

    ```
    title    Kernel Title
    uppermem 524288
    kernel   (hdX,Y)/boot/vmlinuz...
    ```

    Please also note that the 'vmalloc' kernel parameter only exists on Linux 2.6.9 and later kernels. On older kernels, the amount of system memory used by the

kernel can be reduced with the 'mem' kernel parameter, which also reduces the size of the direct mapping and thus increases the size of the kernel virtual address space available. For example, 'mem=512M' instructs the kernel to ignore all but the first 512MB of system memory. Although it is undesirable to reduce the amount of usable system memory, this approach can be used to check if initialization problems are caused by kernel virtual address space exhaustion.

- In some cases, disabling frame buffer drivers such as vesafb can help, as such drivers may attempt to map all or a large part of the installed graphics cards' video memory into the kernel's virtual address space, which rapidly consumes this resource. You can disable the vesafb frame buffer driver by passing these parameters to the kernel: `'video=vesa:off vga=normal'`.

- Some Linux kernels can be configured with alternate address space layouts (e.g. 2.8GB:1.2GB, 2GB:2GB, etc.). This option can be used to avoid exhaustion of the kernel virtual address space without reducing the size of the direct system memory mapping. Some Linux distributors also provide kernels that use seperate 4GB address spaces for user processes and the kernel. Such Linux kernels provide sufficient kernel virtual address space on typical systems.

- If your system is equipped with an X86-64 (AMD64/EM64T) processor, it is recommended that you switch to a 64-bit Linux kernel/distribution. Due to the significantly larger address space provided by the X86-64 processors' addressing capabilities, X86-64 kernels will not run out of kernel virtual address space in the foreseeable future.

Known Issues (to be addressed in future releases)

Both keyboard and mouse are required for station assignment

Currently it is not possible to link *just* a mouse to a screen. Hence, currently a keyboard is required even for touch-screen or mouse-only kiosks. Mouse-only assignment will be supported in a future release. Keyboard-only stations are currently possible, as the mouse can be unplugged after a station has been assigned without unlinking the keyboard (e.g., without the "press F1" overlay re-appearing).

No support for third-party X configuration file editing tools

Userful's Desktop Multiplier software uses a default screen resolution of 1024 x 768 pixels at a standard color depth of 16 bits for all stations. Lower resolutions are automatically used for monitors that do not support this level of resolution. This default configuration may be changed by manually editing the Desktop Multiplier X config file(/etc/X11/userful.Mxorg.conf for both X.Org and XFree86 based systems). Only edit config files if you fully understand what you are doing. Userful does not provide support related to user-edited X config files. This config file is automatically re-generated whenever changes are made to the graphics cards, hence if you add or remove graphics cards, you will need to re-apply your customizations.

Note: Some dual-head video cards do not support using different resolutions on each head. It is recommended to use the same resolution and color depth settings for all stations on your Desktop Multiplier system.

DVI Support

The default Desktop Multiplier configuration will set all outputs of a video card to VGA. A DVI-to-VGA adapter will be required for using DVI ports with the default configuration. DVI connections are also supported if you are using either **ATI Radeon cards** or **NVIDIA cards** by changing the `/etc/X11/userful.Mxorg.conf` manually.

- To use DVI connections in your ATI Radeon cards, follow the instructions below:
    1. Open `/etc/X11/userful.Mxorg.conf` with a text editor.
    2. In every "Device" section of the file, change

        ```
        Option "MonitorLayout" "CRT, CRT"
        ```

        to

        ```
        Option "MonitorLayout" "TMDS, TMDS"
        ```

    3. Save and close the file.
    4. On the next reboot, both DVI and VGA ports will be enabled.

- To use dual-head and DVI connections on your NVIDIA card, NVIDIA's proprietary driver should be installed first. See the information about installing NVIDIA drivers in **Appendix C** of this document. Follow the instructions below to enable DVI connection(s):
    1. Open `/etc/X11/userful.Mxorg.conf` with a text editor.
    2. In every "Device" section of the file, change

        ```
        Option "ConnectedMonitor" "CRT,CRT"
        ```

        to

        ```
        Option "ConnectedMonitor" "CRT,DFP"
        ```

    3. Save and close the file.
    4. On the next reboot, both DVI and VGA ports will be enabled.

Monitors on Dual View stations must be connected to the same video card

Both monitors that form a Dual View station must be connected to ports on the same video card. This is a limitation with some chipsets which may be addressed with workarounds in drivers in a future release.

No support for XineramaInfo in NVIDIA Dual View

XineramaInfo is not supported in the NVIDIA Dual View configuration. Without this support, X will treat two screens as a single big screen, which may cause some unintended results, such as:

- Showing login messages at the center of the display (half on the left screen and the other half on the right screen).
- Maximizing a window over two screens.

Virtualization

Some X Server operations have not yet been fully "virtualized". This means not all aspects of X's functionality work the same in a multi-user environment as they would in a single user environment. The X Resize and Rotate extension (RandR) which allows users to change monitor resolutions has been disabled. Display power management system (DPMS) is not currently supported. And the Gnome screen magnifier does not yet work.

Mandrake's display manager, MDKDM, does not work

Desktop Multiplier is currently not compatible with MDKDM (the default display manager in Mandrake Linux). The Desktop Multiplier installer will disable MDKDM, and enable another supported Display Manager (e.g. GDM, KDM or XDM).

Linspire/Freespire's display manager, ldm, does not work

Desktop Multiplier is currently not compatible with ldm (the default display manager in Linspire/Freespire Linux). The Desktop Multiplier installer will disable ldm, and enable another supported Display Manager (GDM).

Debian-based systems only support keyboards with English-language layouts

Keyboards layouts for other languages are not supported by Desktop Multiplier under Debian at this time.

X stability issues using multiple Dual View configurations

If you are using more than two graphics cards and configure them as Dual View, the X server may crash at the end of the startup procedure. This is caused by incorrect probing of the RAM size for the graphics cards. In this case, you will need to manually specify the correct RAM size of your graphics card by adding a "VideoRam" line to the device section of the `/etc/X11/userful.Mxorg.conf` file.

For example, if the RAM size of the graphics card is 16 Megabytes, add following line into the device section in `/etc/X11/userful.Mxog.conf`:

```
VideoRam  16384
```

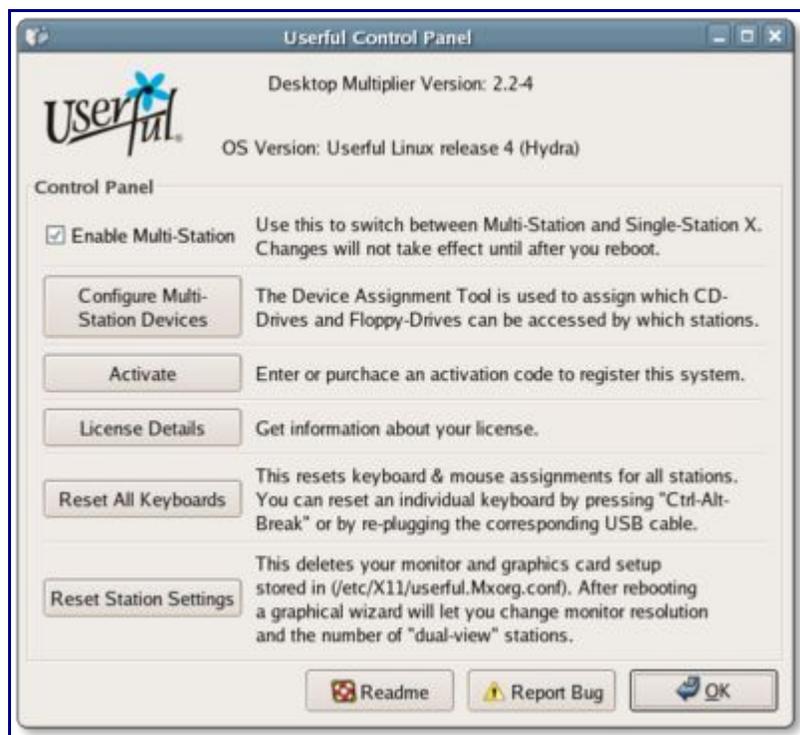## KDM login screen doesn't appear on the center of display in Kubuntu 6.06 and 7.04

This is not a functional problem. The KDM login screen appears a little to the right, below center, when a user logs out of a session.

Mouse problem with VNC connection

The mouse doesn't work with VNC and Desktop Multiplier at this time.

Technical Support

Reporting a Bug Via the Control Panel

There is a `Report Bug` button at the bottom of the Control Panel. This is the best way to send this information to Userful support staff.

If you have any questions or problems please contact us:

- http://userful.com/support/issue
- Voice: (403) 289-2177 ext. 2
- Fax: (403) 206-7010
- e-mail: support@userful.com

To get help quickly, it is important to be as specific as possible about your problem.

Be sure to include the following information:

- Operating system: (ex: Fedora Core 2)
- Version numbers of 1box-utils-k26 and 1box-server-xorg packages installed
- Video card: The make and model of your VGA video card(s), along with the total number of video ports installed on your system.
- Detailed description of your problem or question

- Computer information: CPU type/speed, motherboard make/model, and installed memory
- Any kernel or X, or X.Org/XFree86 configuration file changes you have made

Reporting a Bug Via the Command Line

Sometimes the GUI (Graphical User Interface) is not available for some reason. In this case, debug info can also be submitted by opening a terminal, switching to root, and running the command line version of the program like this:

```
$ /usr/share/submit-debug-info.sh
```

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Appendices

Appendix A: Key config files updated during DM installation and first bootup

During the installation and first bootup, Desktop Multiplier creates it's own X config file and updates startup procedure and the config file of Display Manager.

Startup Procedure

Desktop Multiplier updates `/etc/inittab` to start Userful's Multi-X in the end of the startup. For the Linux distros using `Upstart` instead of `inittab` like Ubuntu, DM adds a new task, `dm-start`, into `/etc/event.d` directory.

X config file for DM

Desktop Multiplier starts Userful's Multi-X instead of normal Xorg for it's X server. Multi-X uses `/etc/X11/userful.Mxorg.conf` as the config file.

gdm.conf for GDM

Desktop Multiplier updates gdm.conf to support multiple stations from a single Multi-X server. Instead of handling the real X server, Desktop Multiplier updates gdm.conf so that GDM uses `Login Server` for each station. The `Login Server` is a dummy X server that Userful developed for Desktop Multiplier.

Appendix B: Installing Matrox's proprietary driver

Support for the second head on Matrox cards requires Matrox's proprietary driver. Please follow the instructions below to install the driver with Desktop Multiplier:

1. Install Desktop Multiplier if you have not already done so.
2. Download Matrox's proprietary driver for your card from
   http://www.matrox.com/graphics/en/corpo/support/drivers/driverList.php?list=5
3. Open a terminal program.
4. Extract the downloaded file:

   ```
   $ tar xvfz <file name>
   ```

5. Change directory to the newly created directory:

   ```
   $ cd <directory name>
   ```

6. Run Userful's install script:

   ```
   $ userful driver -install matrox
   ```

7. Reboot the system.

Appendix C: Installing NVIDIA's proprietary driver

To support dual-head properly on NVIDIA cards, NVIDIA's proprietary driver should be used instead of the built-in **nv** driver. The correct NVIDIA driver for each GPU chipset can be found at http://us.download.nvidia.com/XFree86/Linux-x86/1.0-9755/README/appendix-a.html .

There are two methods to install the NVIDIA driver and kernel module:

- **By recompiling the NVIDIA kernel module** -- download the NVIDIA INSTALLER and find instructions at http://www.nvidia.com/object/unix.html .
- **By installing a package** -- Major Linux vendors such as SuSE, Fedora and Ubuntu also provide a way to install the NVIDIA driver and kernel module with their packaging system.

Note for SuSE Linux user: It is highly recommended that you use `yast` to install the NVIDIA driver through a package. It has been reported that installing the driver and kernel module by recompiling them causes X to sometimes crash.

Fedora Core 6

Anaconda has a well documented defect where it installs the i586 based kernel on i686 machines. This causes problems with several drivers including the NVIDIA driver. Please note, too, that you will gain some performance improvement by moving to the i686 kernel.

Do the following to deal with this defect. (Note: All the following commands must be run as root.)

- Check the architecture of the CPU:

  `$ arch`

- Find out which kernel architecture is installed:

  `$ yum list kernel`

If the installed kernel architecture is i586, but your machine is i686 capable (Pentium II or K6II or higher), use the following method to install the i686 kernel:

1. Install `yumdownloader`. This is part of `yum-utils` in the Fedora Extras repository:

   `$ yum install yum-utils`

2. Get the current i686 kernel:

   `$ yumdownloader kernel.i686`

3. Install the downloaded kernel:

   `$ rpm -ivh kernel-*.i686.rpm`

4. Reboot the machine to start with the new kernel installed:

   `$ reboot`

Now you can install the NVIDIA driver from the Livna repository.

1. Add the Livna repository:

   ```
   $ rpm -Uvh http://rpm.livna.org/livna-release-6.rpm
   ```

2. Install the NVIDIA driver and kernel module:

   ```
   yum install kmod-nvidia
   ```

SuSE LINUX (openSuSE, SLED)

Please refer to http://www.suse.de/~sndirsch/nvidia-installer-HOWTO.html to find more information about installing the NVIDIA driver with yast.

- There are two mistakes found in the instructions for **SLED10** users:
    1. The line which reads

       ```
       YaST -> Software -> Change installation Source -> Add
       ```

       should be changed to

       ```
       YaST -> Software -> Installation Source -> Add
       ```

    2. The line which reads

       ```
       YaST -> Software -> Install and Delete Software
       ```

       should be changed to

       ```
       YaST -> Software -> Software Management
       ```

Ubuntu 7.04

The NVIDIA driver can be installed using the **Restricted Devices Manager** on Ubuntu 7.04: http://ubuntuguide.org/wiki/Ubuntu:Feisty#How_to_setup_nvidia_drivers_in_7.04

Appendix D: The Userful Command Line Tool

There are a lot of commands related to Destkop Multipler. Since each command has a different name and usage, it may be hard to find the right command for a task. Here is some brief documentation for the **Userful Command Line** tool which combines all commands into a single interface. The command will be updated and extended as needed and the documentation will also be available as a Linux man page. (The man page for this tool is not yet available.)

```
NAME

    userful - Userful command line tool


SYNOPSIS

    userful command [command_opts] [command_args]
```

DESCRIPTION

Desktop Multiplier is a set of software that extend the X Window System
to support up to 10 fully independent and concurrent workstations using
a single computer box.

The userful program is a command line tool to use the various Desktop
Multiplier commands from the shell. It can be used for:

 - Creation of X config
 - Controlling of Video cards and input devices
 - Handling of debug information
 - Getting/displaying license
 - Handling of general settings

COMMAND SUMMARY

The userful program provides a variety of commands, each of which has
different options and arguments.

xconfig - Handling X config file

    SYNOPSIS
          userful xconfig [OPTION]

             OPTIONS:
                       -h   - Print help message
                       -gen   - Generate an X config file for Desktop
                                   Multiplier
                       -show   - Display the X config file
                       -remove - Remove the X config file

video   - Video cards control

    SYNOPSIS
          userful video [OPTION]

             OPTIONS:
                       -h   - Print help message
                       -show   - Probe and display all video cards
                       -blacklist [opt] [arg] - Maniplate blacklist
                       -whitelist [opt] [arg] - Maniplate whitelist

input   - Input devices control

    SYNOPSIS
          userful input [OPTION]

             OPTIONS:
                       -h   - Print help message
                       -reset   - Unlink the assignment of all input
                                   devices
                       -static - Enable/disable static config type

```
debug    - Creating/submitting debug info

    SYNOPSIS
          userful debug [OPTION]

           OPTIONS:
                    -h        - Print help message
                    -submit   - Submit debug information to Userful
                                Support

 license - Getting/displaying license

    SYNOPSIS
          Not implemented yet

 driver - Handling video drivers (Only one fuction for now: Installing
          Matrox driver)

    SYNOPSIS
          userful driver [OPTION]

           OPTIONS:
                    -h                - Print help message
                    -install matrox   - Install Matrox driver

 multistation - Toggling between multistation and singlestation

    SYNOPSIS
          userful multistation [OPTION]

           OPTIONS:
                    -h        - Print help message
                    -enable   - Enable multistation
                    -disable  - Disable multistation (Enable
                                 singlestation)

 ctrlaltbreak - Enable/disable Ctrl-Alt-Break functionality. (Default:
                Enabled)

    SYNOPSIS
          userful ctrlaltbreak [OPTION]

           OPTIONS:
                    -h        - Print this help message
                    -enable   - Enable Ctrl-Alt-Break functionality
                    -disable  - Disable Ctrl-Alt-Break functionality
```