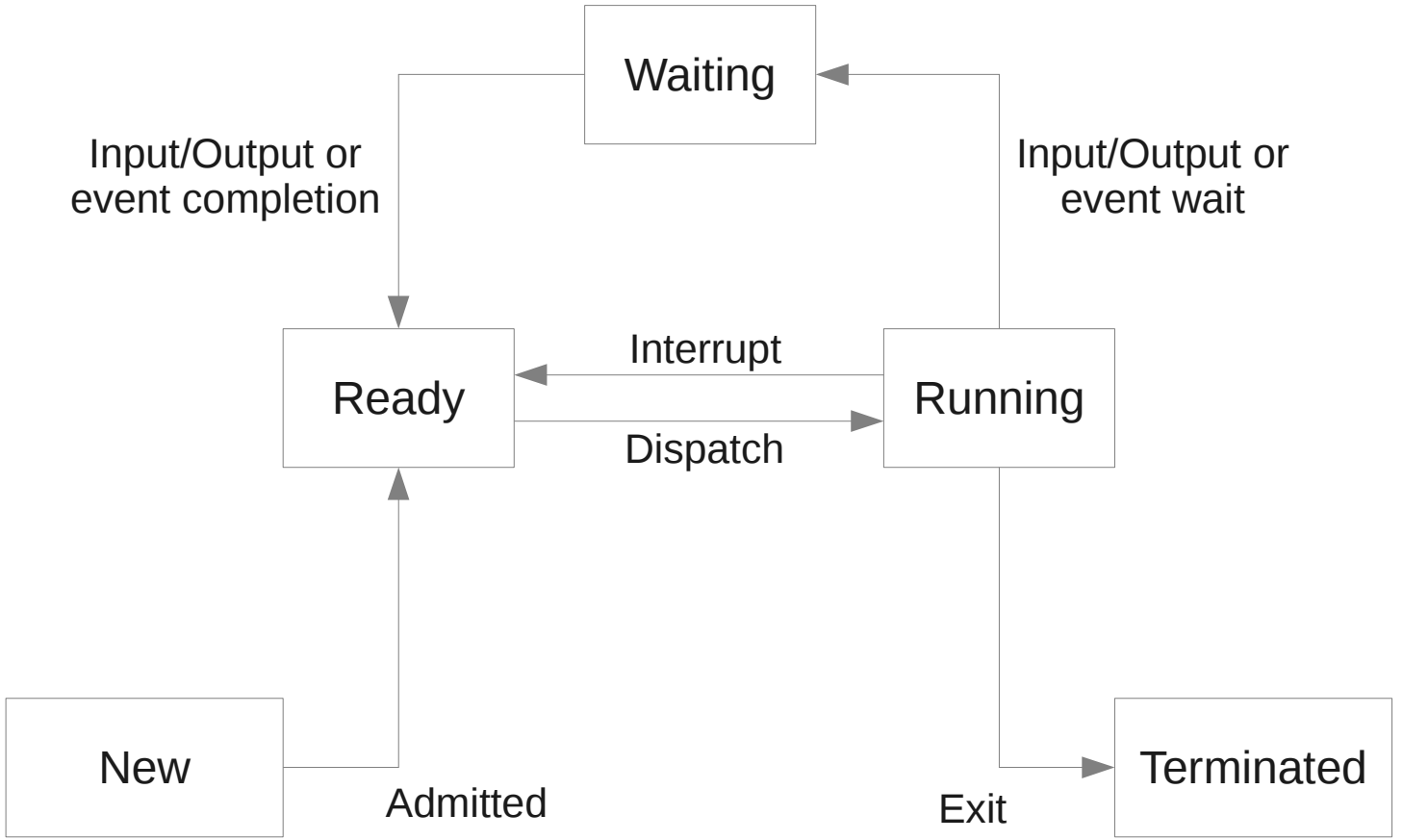
Process Management

- The OS also manages the use of CPU by individual processes.
- A process moves through specific states during its lifecycle while managed by the OS.
  - New State
  - Ready State
  - Running State
  - Wait State
  - Terminated State

Process Management



The Process life cycle

Process Scheduling

- The Process Control Block -- Data structure used by the operating system to manage information about a process.
  - Each state is represented by a list of PCBs, once for each process in that state.
  - The PCB stores a variety of information
    - Value of program counter and other CPU registers
    - CPU scheduling information
    - Memory management information
    - Accounting Information
- Context Switch – The exchange of register information that occurs when one process is removed from the CPU and another takes its place

CPU Scheduling

- Act of determining which process in the ready state is moved to the running state.
- Non-preemptive scheduling – CPU scheduling that occurs when the currently executing process gives up CPU voluntarily.
- Preemptive scheduling – CPU scheduling that occurs when the operating system decided to favor another process, preempting the currently executing process.

CPU Scheduling

- Turnaround time – The CPU scheduling metric that measures the elapsed time between a process's arrival in the ready state and its ultimate completion.
- Ideally the turnaround time for the processes should be small.
- First-Come First-Served scheduling (FCFS)
  - Processes are moved to CPU in the order they arrive in the running state.
  - Non-preemptive.
  - Easy to implement, not efficient.

CPU Scheduling

- Shortest Job Next scheduling (SJN)
  - The algorithm looks at all the processes in ready state and dispatches one with the shortest service time.
  - Non-preemptive.
  - Relies on knowledge of future – the estimated time for completion of each job.
  - Provably optimal, but sub-optimal in practice due to not knowing the service time of all the jobs that are waiting to be executed.

CPU Scheduling

- Round Robin CPU scheduling
  - Distributes the processing time equitably among all ready processes.
  - Establishes a time slice – the amount of time given to each process – before a process is preempted and returned to the ready state to allow another process to take its turn.
  - Eventually the preempted process will be given another time slice.
  - Procedure continues until the process gets all the time it needs to complete.
  - Supports all kinds of jobs and is considered the most fair algorithm – probably the most widely used.

Disk Scheduling

- The act of deciding which outstanding request for disk I/O to satisfy first.
- Hard disk is the most important secondary storage device.
- It is also the worst bottleneck in a general computer system.
- Hard disks – a stack of platters – a number of tracks – a number of sectors.

Disk Scheduling

- The seek time is the amount of time it takes for the read/write heads to reach the appropriate cylinder.
- The latency is the additional time it takes for the platter to rotate into the proper position so that the data can be read or written.
- Seek time is more restrictive of the two parameters and is the primary issue dealt with by disk scheduling algorithms.

Disk Scheduling

- First-Come, First-Served Disk Scheduling
  - Similar to FCFS.
  - Easiest to implement, not efficient.
- Shortest-Seek-Time-First Disk Scheduling (SSTF)
  - Moves the head by the minimum amount necessary to satisfy any pending request.
  - Improved performance over FCFS.
  - Can suffer starvation unlike FCFS.

Disk Scheduling

- SCAN Disk Scheduling
  - The read/write heads move in toward the spindle, them move toward the platter edge, then back toward the spindle and so forth, servicing requests on the way.
  - New requests are not given any special treatment.
  - No starvation since all requests are guaranteed to be processed.
  - Circular SCAN – when the head reaches one extreme it returns to other extreme without processing requests.
  - LOOK disk scheduling – move only as the outermost or innermost request.

File system

- File – A named collection of data, used for organizing secondary memory.
- File system – The operating system's logical view of the files it manages.
- Virtual File System – an abstraction layer on top of a more concrete file system providing access to files in an uniform way.
- Specifies an interface between the kernel and concrete file system.
- The Filesystem in Userspace (FUSE) mechanism allows userland code to plug into the virtual file system mechanism.

Device Drivers

- A computer program allowing higher-level computer programs to interact with a hardware device.
- Operating System specific.
- Higher level code can be independent of specific hardware device.
- Abstracted into
  - Logical layer – device driver for Ethernet ports.
  - Physical layer – for a specific hardware device.

Device Drivers

- Written by engineers with an in-depth understanding of how the hardware and the software of a given platform function.
- The Logical Device Driver is written by the operating system vendor.
- The Physical Device Driver written by the hardware manufacturer.
  - Outsiders can write provided vendors provide specifications.
  - Reverse engineering not as efficient.

Networking

- The OS is responsible for connecting various computer and devices to form a computer network.
- An OS can connect to a remote computer and use the resources as if they were connected locally.
- Client/Server.
- Vendor specific or open protocols.

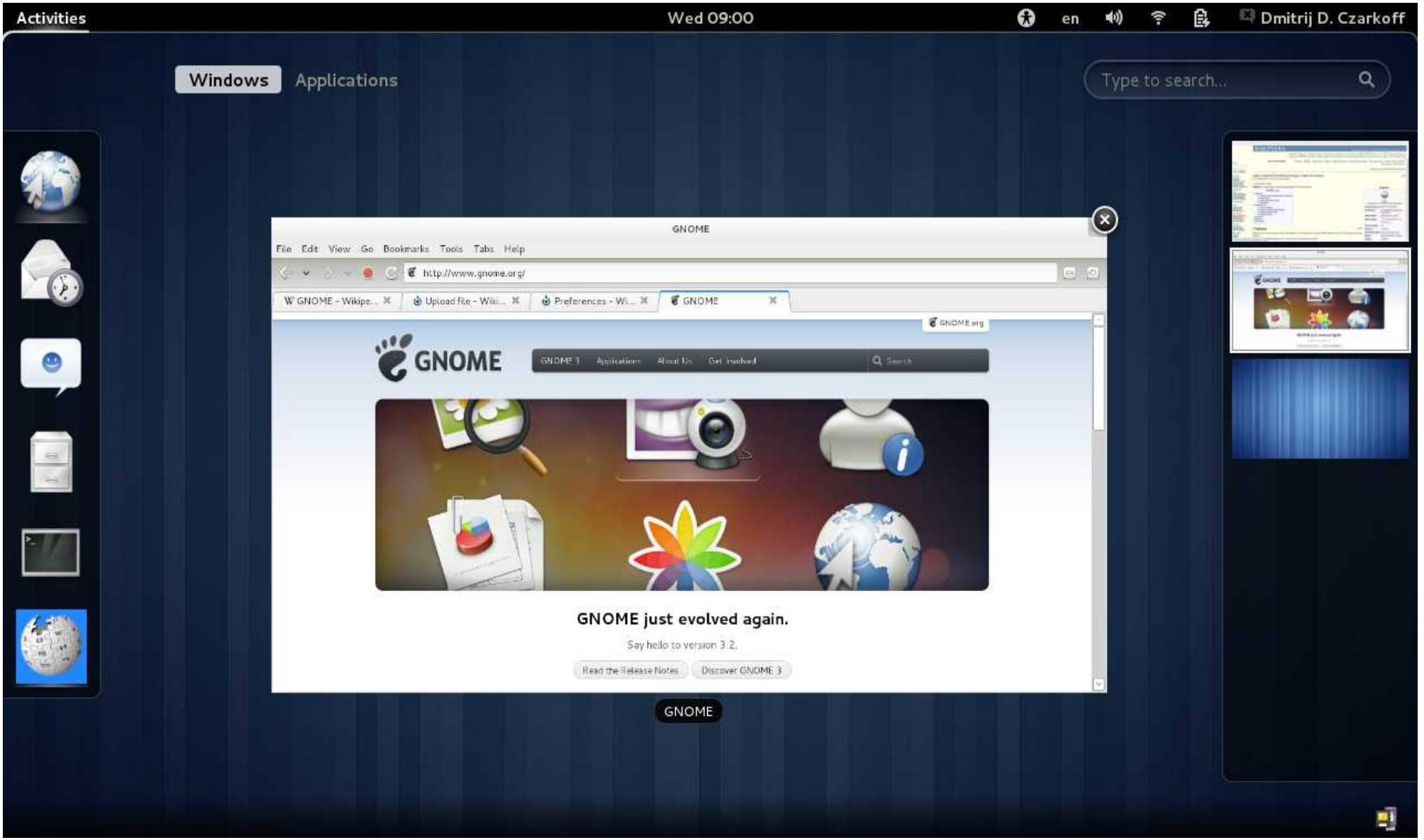
Security

- The OS provides access to a number of resources which are available to software running on the system and over the network.
- The OS must be capable of distinguishing between requests which should be allowed to be processed and others which should not be processed.
- Authentication.
- Authorization.

User Interfaces

- Not actually part of the OS.
- Main means by which users interact with the computer.
- Deals with requests coming from any input device and request the OS to provide the output in an output device.
- Common types:
  - Command Line Interface (CLI)
  - Graphical User Interface (GUI)

GNOME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GNOME
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Say hello to version 3.2.
Read the Release Notes
Discover GNOME 3
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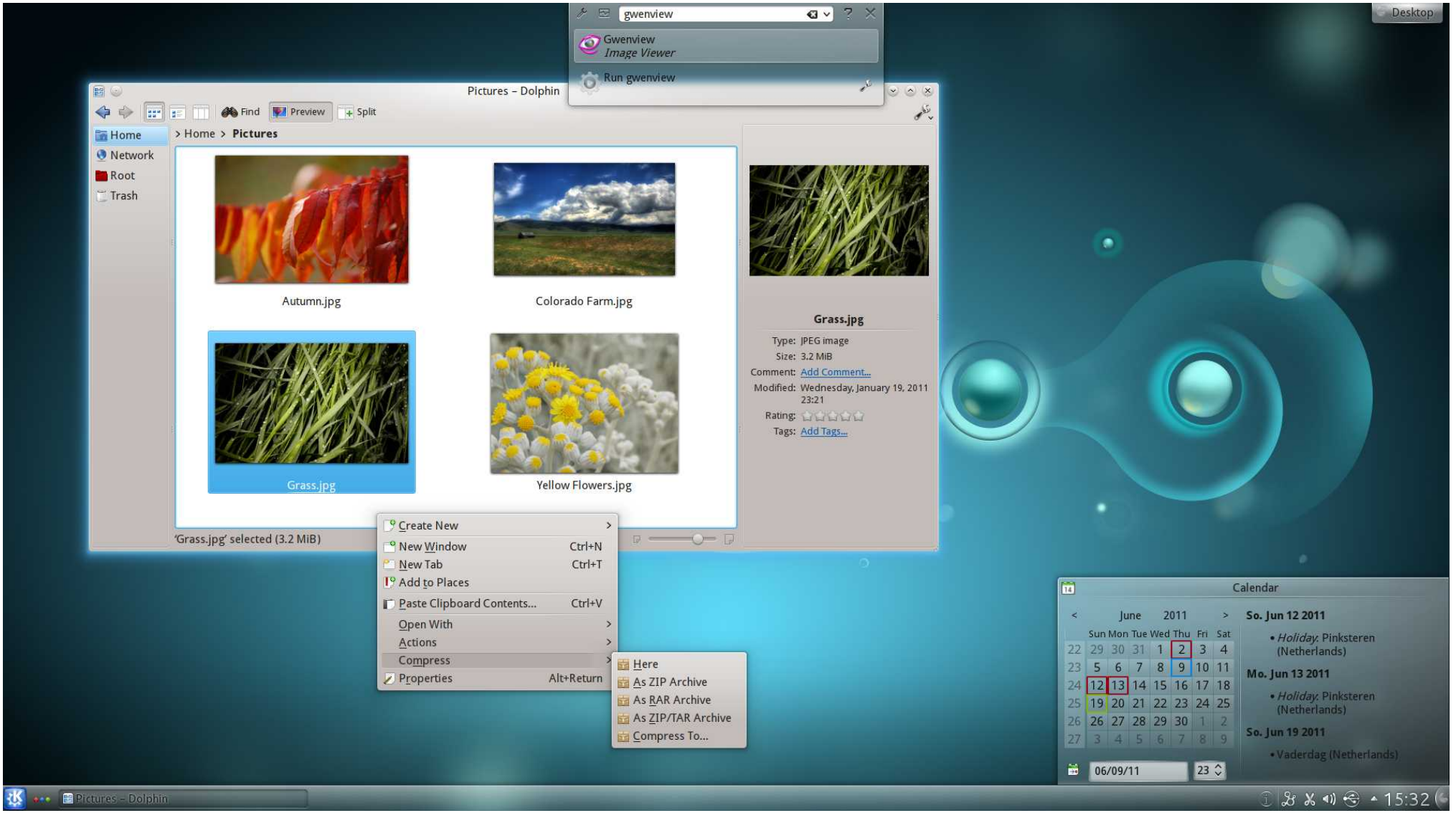
KDE


gwenview
Gwenview
Image Viewer
Run gwenview
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Trash
> Home > Pictures
Autumn.jpg
Colorado Farm.jpg
Grass.jpg
Yellow Flowers.jpg
Grass.jpg
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Comment: Add Comment...
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Rating:
Tags: Add Tags...
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New Tab Ctrl+T
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• Holiday: Pinksteren (Netherlands)
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• Vaderdag (Netherlands)
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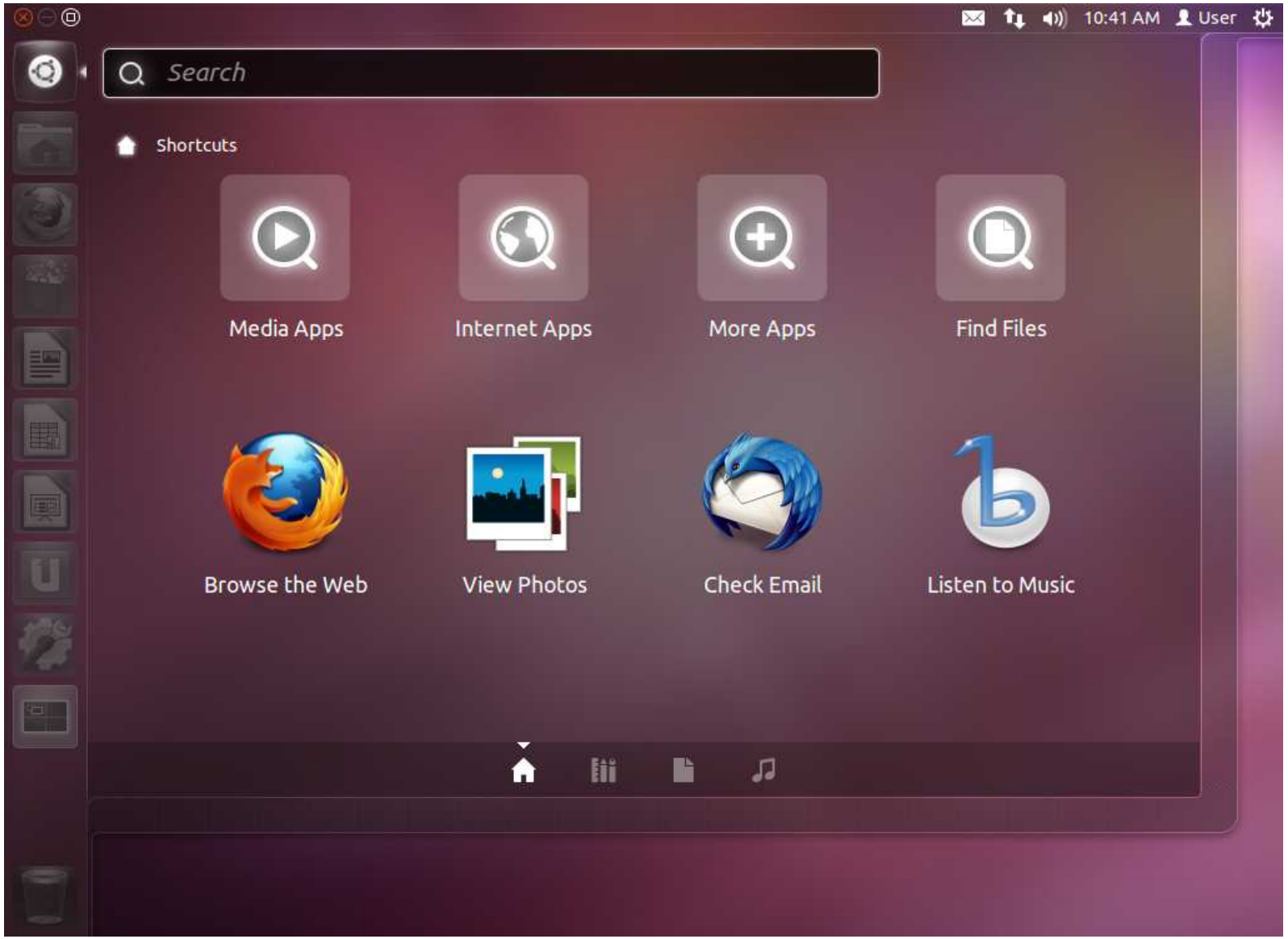
KDE Plasma Netbook

Unity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User
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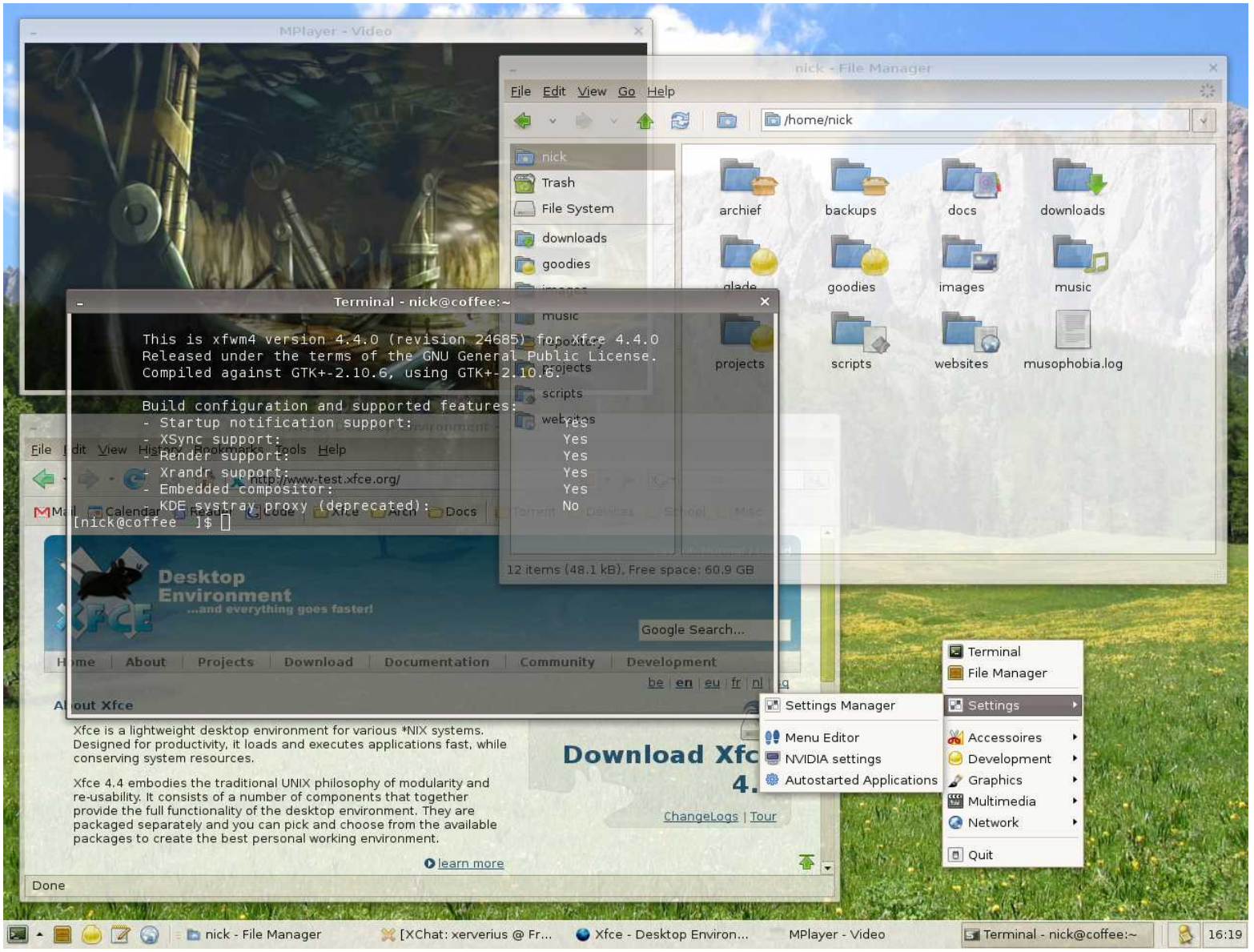
Shortcuts
Media Apps
Internet Apps
More Apps
Find Files
Browse the Web
View Photos
Check Email
Listen to Music

Xfce


MPlayer - Video
nick - File Manager
File Edit View Go Help
/home/nick
nick
Trash
File System
downloads
goodies
music
projects
archief
backups
docs
downloads
glade
goodies
images
music
projects
scripts
websites
musophobia.log
12 items (48.1 kB), Free space: 60.9 GB
Terminal - nick@coffee:~
This is xfwm4 version 4.4.0 (revision 24685) for Xfce 4.4.0
Released under the terms of the GNU General Public License.
Compiled against GTK+-2.10.6, using GTK+-2.10.6.
Build configuration and supported features:
- Startup notification support: Yes
- XSync support: Yes
- Render support: Yes
- Xrandr support: Yes
- Embedded compositor: Yes
- KDE systray proxy (deprecated): No
[nick@coffee]$
Desktop Environment
...and everything goes faster!
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Xfce is a lightweight desktop environment for various *NIX systems. Designed for productivity, it loads and executes applications fast, while conserving system resources.
Xfce 4.4 embodies the traditional UNIX philosophy of modularity and re-usability. It consists of a number of components that together provide the full functionality of the desktop environment. They are packaged separately and you can pick and choose from the available packages to create the best personal working environment.
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Settings
Settings Manager
Menu Editor
NVIDIA settings
Autostarted Applications
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Graphics
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MPlayer - Video
Terminal - nick@coffee:~
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