

Project #1: Command-Line User Interface Shell and Utilities

Outline

- Background
- General Requirements/Assumptions
- Implementation Tools
- Details
- Questions

Operating Systems

- Provides resources and services

- Examples

Project #1

- High-level interactions with user
- Protection mechanisms (e.g., process model)

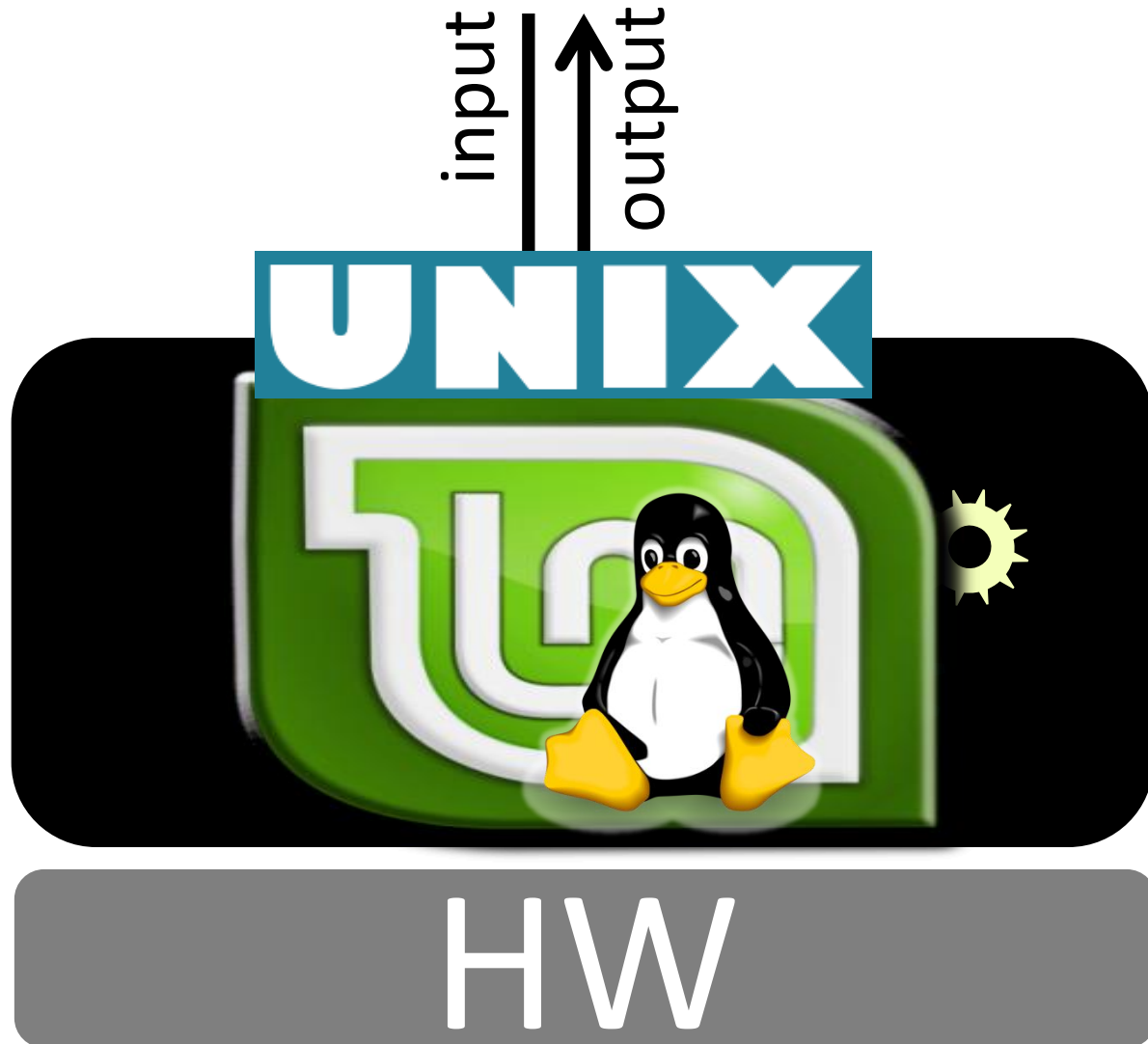
Project #2

- Processor scheduling
- Synchronization (Serialization) of executing code

Project #3

- Filesystem

Base System



Command-Line Shell

- Provides means for user to interact with OS
 - View/modify state of the system
- Simple and easy to use
- Considered a component of the OS

Requirements

- User prompt
- “built-in” utilities (Execute utility directly without searching for it)
 - cd
 - ioacct
 - exit
- Start the execution of programs
 - background
- I/O redirection
 - input
 - output
 - pipelining

Assumptions/Requirements

- Program written in C
- Makefile to build program
- No zombie processes
- No memory leaks

IMPLEMENTATION TOOLS

gcc Compiler

- Warnings are your friend and you don't ignore your friends (most of the time)
- Useful gcc options
 - **Wall**
 - **Wextra**
 - **pedantic**
 - **Wconversion**
 - **Wshadow**
 - **std=c11** or **-std=c99**

Makefile

- Targets
 - Name of file
 - Name of an action
- Prerequisites
 - File/action that target depends on
 - E.g., Source code files to create executable
- Recipe
 - Actions to create target file or satisfy named action

```
target(s) : dependency(ies)  
<tab>recipe  
...
```

PROJECT DETAILS

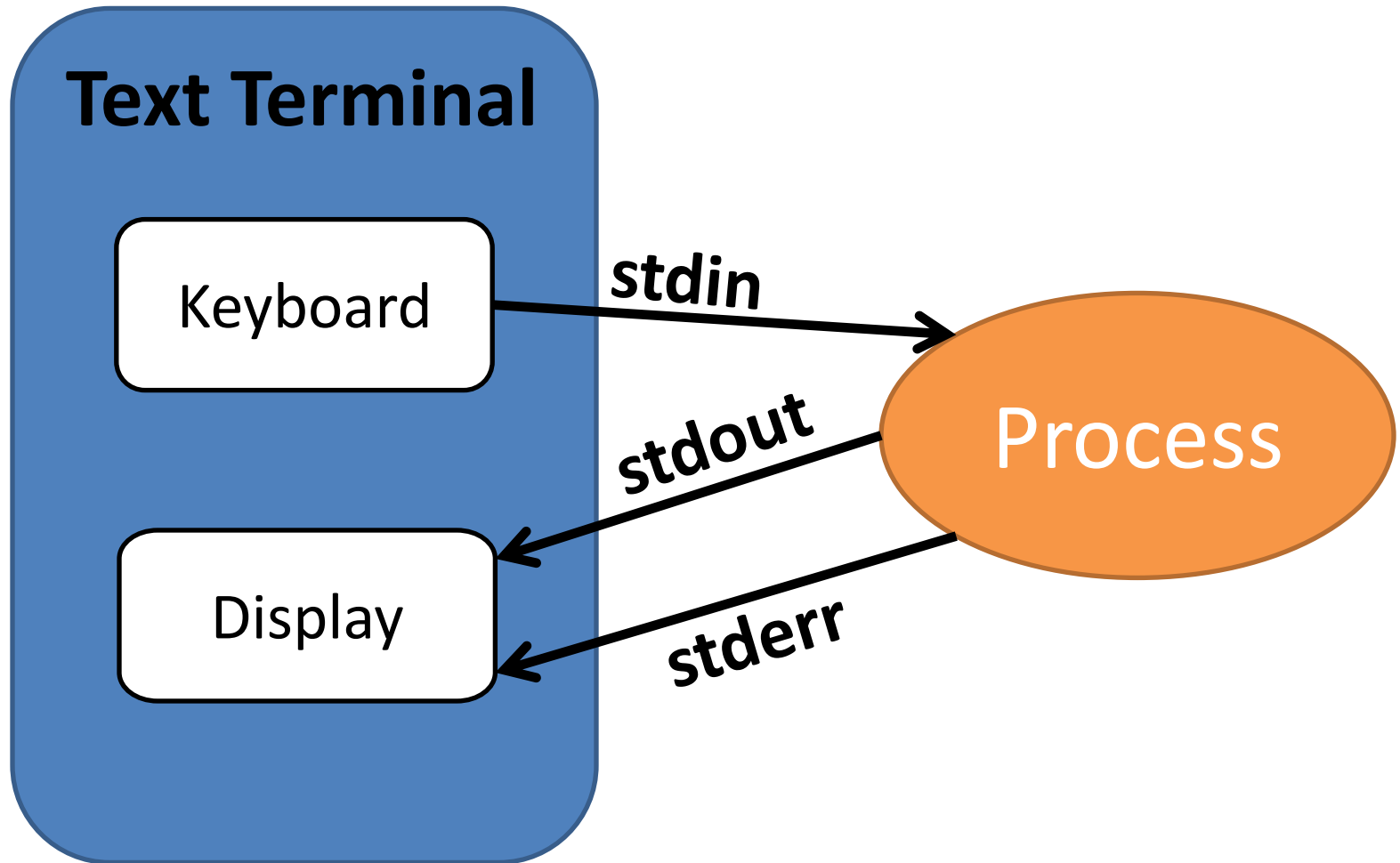
Prompt

<username>@<hostname>:<working_directory> \$

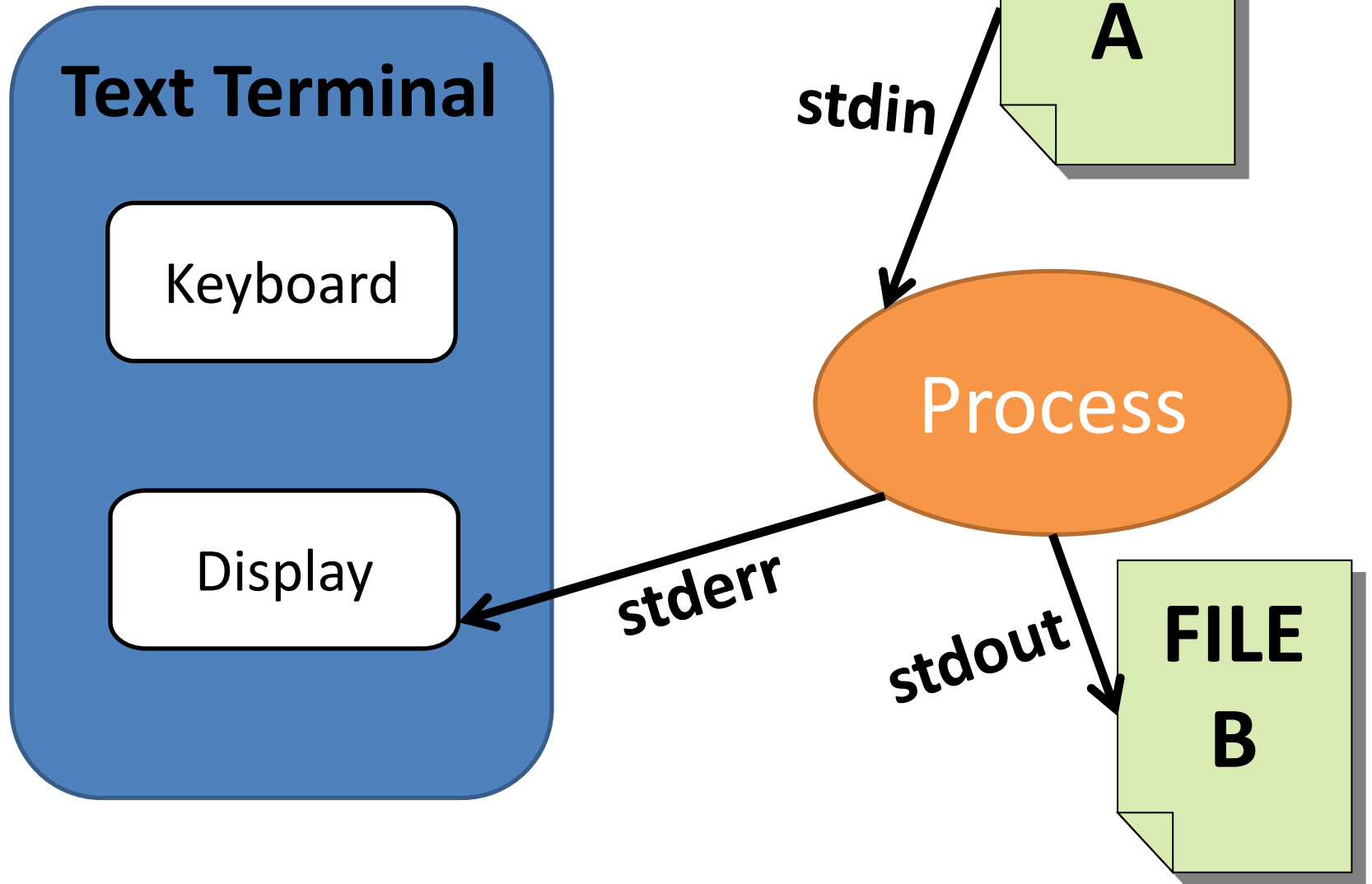
Example:

cop4610t@linprog:/home/grads/cop4610t \$

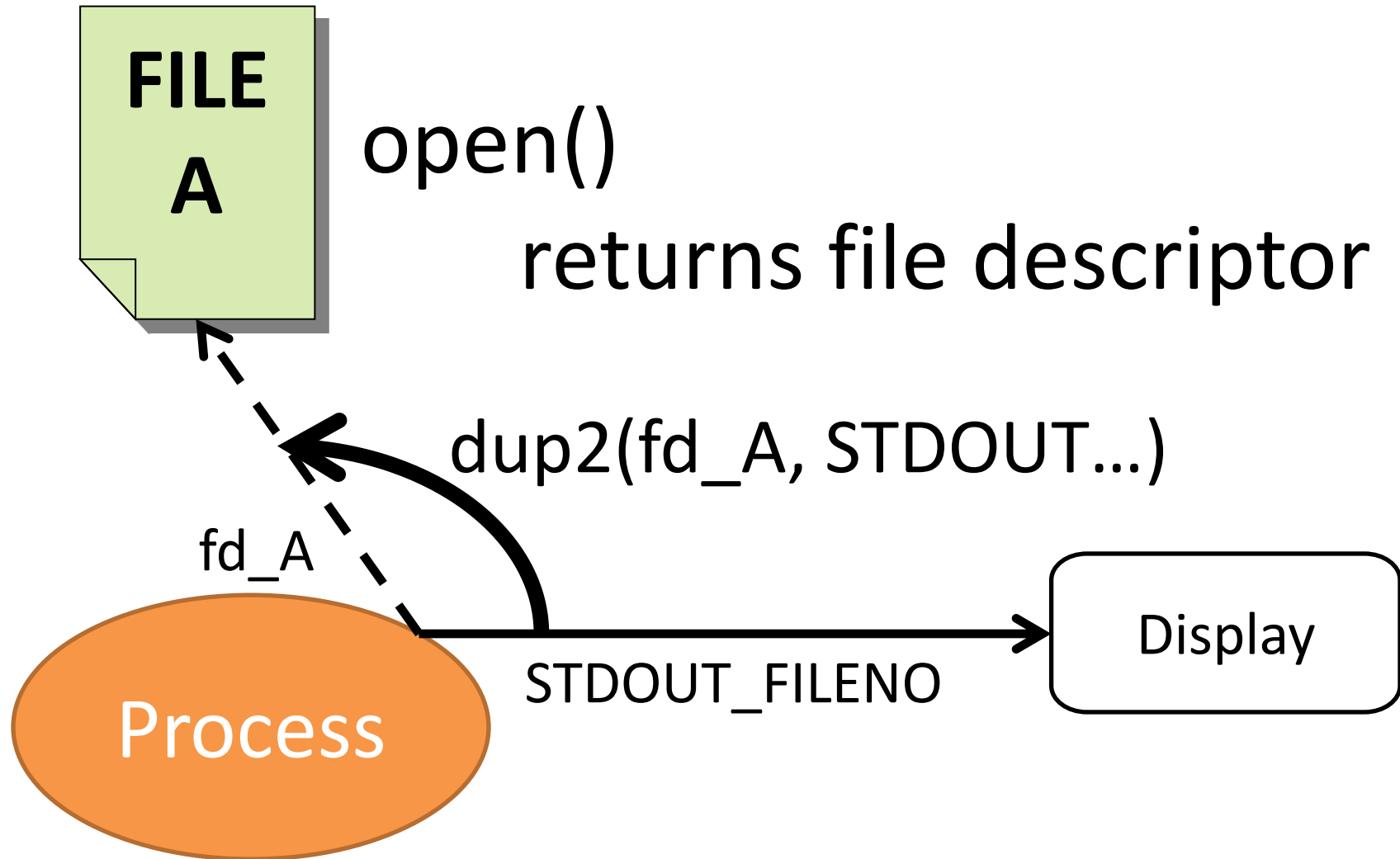
I/O Redirection



I/O Redirection



Redirect



File Descriptors

Kernel

File Descriptor Table (per-process)

ptr to terminal i/p

pointer to file A

ptr to terminal o/p

pointer to file A

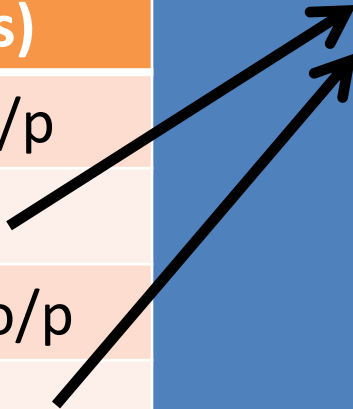
<empty>

File Descriptors

Kernel

File Descriptor Table (per-process)
ptr to terminal i/p
pointer to file A
ptr to terminal o/p
pointer to file A
<empty>

Open File Table			
#	Off-set	...	inode



Protection

User Space

----- dup2() -----

Kernel Space



QUESTIONS?