CSE2031 Software Tools - UNIX scripting

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Notes

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Shell and commands

Shell

Shell is the program that interprets your requests to run programs

Command

- single word like i.e. `who` or command plus args
- ends with `newline` or ;
- & runs command in background

Notes

Shell meta-characters

Notes

Variables

Environment variables

`$HOME, $PATH, $USER, $MAIL, $PWD, $HOST,`

Defined by user

No need to declare. Accessed by $

Notes

Cammand processing

- Variable substitution
- Command execution by shell
  - Builtin commands executed within shell process (Example: cd)
  - For all other commands the shell
    - Scans search path for file with same name
    - Uses fork() to create a new process
    - Uses exec() to load the program and execute it

Notes

Finding program

Search paths are storen in an variable `$PATH`. It is a list of directories separated by `':'`.These directories are searched in the order they are given.
Directories called "bin" typically contain programs under Unix
If a command name contains a `'/'`, the search path is not used i.e. `/usr/bin/cal`

Notes

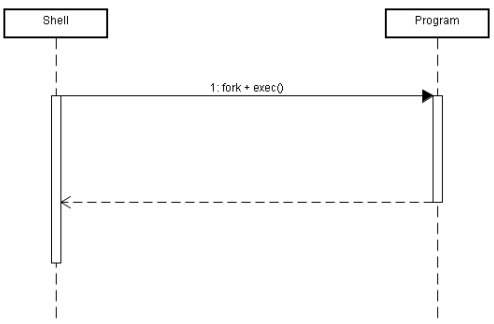
Program Execution

When executing a program, the shell:

- Starts a new process
- Executes the program file that it found
- Then waits for the program to finish

Notes

Shell calls and waits



Notes

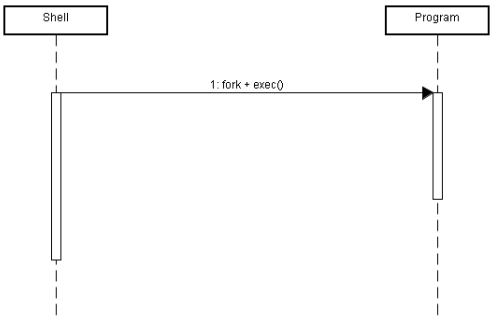
Background Tasks

- You can use the '&' character to tell the shell to run the program in the background
- A background process is one that is running but that you are not waiting for

```
echo $HOME &
```


Notes

Shell calls and does not wait



Notes

Wait

We can change our mind The command `wait` will make the shell stop until all background processes have finished

Notes

Conditional execution

```
command1 && command2
```

run command1; only if successful, run command2

```
command1 || command2
```

run command1; only if unsuccessful, run command2

Notes

Exit status

Every program in Unix has an exit status:

- 0 = success/true
- nonzero = failure/false

Note that this is opposite to C!

Notes

Loops

sh

```
for variable in list_of_values
do
    command1
    command2
        ...
done
```

bash loops (C-like)

```
for ((i=1; i <= 10 ; i++))
do
    commands
done
```


Notes

If-Else Statements

```
1  if (condition_command) then
2      command1
3      command2
4      ...
5      last_command
6  else
7      command1
8      command2
9      ...
10     last_command
11 fi
```


Notes

Quotes

Single

Single quotes ’ ’ – All characters inside single quotes are treated as nonspecial (except ’)

Back-quotes

Back-quotes ‘ ‘ – the contents of the quote is treated as a shell command but special characters are not processed

Double

Double-quotes " " like single quote except the variable substitution $ and backquotes ‘ are still treated as special characters

Notes

Comments

Comments start with a ’#’ character, terminated by newline

```
#this is a comment
```

In the first line of a shell program `#!<shell>` specifies which shell is used to run the script

```
#!/cs/local/bin/sh
```


Notes

Sub-shells

When needed shell calls fork to create new process (like fork() in C)

- We can do this explicitly with ( ) operator
- Causes command to be executed in a subshell
- Changes in subshell do not affect its parent!

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