Project Proposal

Richie, Chris, Tom, Shaun, Reuben

April 4, 2014

1 Executive Overview

The Unicorn Shell (working title) will be a modern, POSIX style shell which will be released on linux, OSX and Windows under the FreeBSD License. The project will written almost entirely in C++ and al the source code will be released in it's entirety.

The Unicorn Shell will be targeted at those of beginner level, people who are not particularly skilled at using a shell, and possibly even those who have never used one before.

The shell will be developed to be intuitive. Basic shell operations will be natural interactions, that most computer users are familiar with, anyone will be able to pickup unicorn very quickly, even those from different OS backgrounds.

Despite the target audience of our Shell, it will still provide the full feature set that advanced users would expect.

Such features will include tab-completion, inline command prediction and detection, stream redirection, job control, command history and aliases. And almost everything will be able to be customised.

It will also look pretty with proportional width font, no more ugly monospaced grabage, only the most beautfilly kerned Helvetica.

2 Introducion

Thank you for choosing to read our project proposal

We are INSERT NAME HERE and we are extremely excited to show you our proposal. When set with the task of designing and creating a new shell we had a number of ideas that sprang to mind and a great deal more that became more apparent to us as we researched shells in greater detail and found things that we felt a shell would benefit from having.

3 Team Summary

Reuben Crimp (Surgeon):

Reuben began programming in high school, making what interested him, games and websites. He graduated highschool doing well in mathematics. He enrolled at Otago University in mid 2012, majoring in computer science, with a minor in mathematics. He has very little industry experience but a strong passion for the subject matter.

Shaun Wratten (Co-pilot):

Shaun recently graduated from UCOL in Palmerston North with a Bachelors degree in Information and Communications Technology, in which he learnt a decent portion of his skill set. This includes programming in C#, C++, scripting and web design using PHP and Javascript, and working with MS-SQL and MySQL database. One of the major things he learnt while studying was how to strutter a team project and hot to be as successful leader and team member.

Chris McMillan (Toolsmith):

Chris has studied at the University of Otago since 2010, but only became interest in computers after high school. He completed a chemistry degree and then decided that his passion lay in computers and began study towards a computer science major as well. He will finish his BSc double major at the end of 2014. His main strengths are music and audiosoftware. Chris can confidently write Java and Python programs, but building a shell in C++ will be a challenge for him that he looks forward to and hopes to learn a lot from.

Thomas Hall (Lanuage Guru and Tester):

Thomas is a recent graduate with BSc in Physics. He is currently studying a DipGrad in computer science to be finished in early 2015. He has experience programming in C# from experimenting with Unity, and Matlab as part of his physics education. He also has a experience with Java and Python.

Richie McKee (Editor and Program Clerk):

Richie completed his LLB/BA at the end of 2012 at Otago University. He always had a strong desire to learn computer science but is only now taking steps towards doing so. He began his DipGrad at the start of 2014 and hopes to be completed by the end of the year. As such his current level of experience is limited and his experience with programming is limited to what he learnt during Summer School and what he is currently covering throughout the semester. To him the project is a daunting but exciting prospect that he hopes to learn from.

4 Tools and Hardware

Windows

IDE	Visual Studio 2013
libs	C++ libraries
GUI	WIN32

OSX

IDE	Xcode
libs	C++ libraries
GUI	Cocoa graphics

Linux

compiler	g++
libs	C++ libraries
GUI	X11

Revision Control

We will use git for our distributed revision control, with project hosting by github.com.

5 The Shell

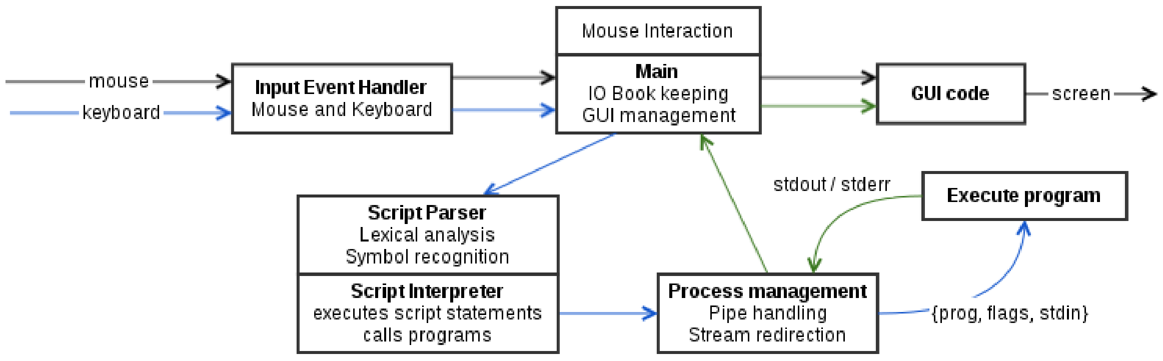
As mention earlier, this shell will be released on linix, OSX and windows, and will come with most of the features you'd expect from a modern shell. as well as several usability enahancements described in the sections below.

1. Stream redirection '<' and '>'
2. Piping with '|'
3. Tab completion
4. Job control
5. Comamnd history
6. Aliases
7. Directory stack

Modularised Code

The diagram below shows the modules we plan to implement in the final piece of software, and how they interact with each other.

As you can see input is captured from the users keyboard/mouse, which goes straight to the "main" module, (where GUI commands may be called), it then goes through the script parser where, symbols are seperated and recognised, like pipe, and redirection symbols, but more generally our scripting language. to the "process management" module, which executes programs, are sends the "stdout" stream to the "main" module, or it will retain that information and pipe programs togethor. The "GUI code" module draws it all onto the screen.



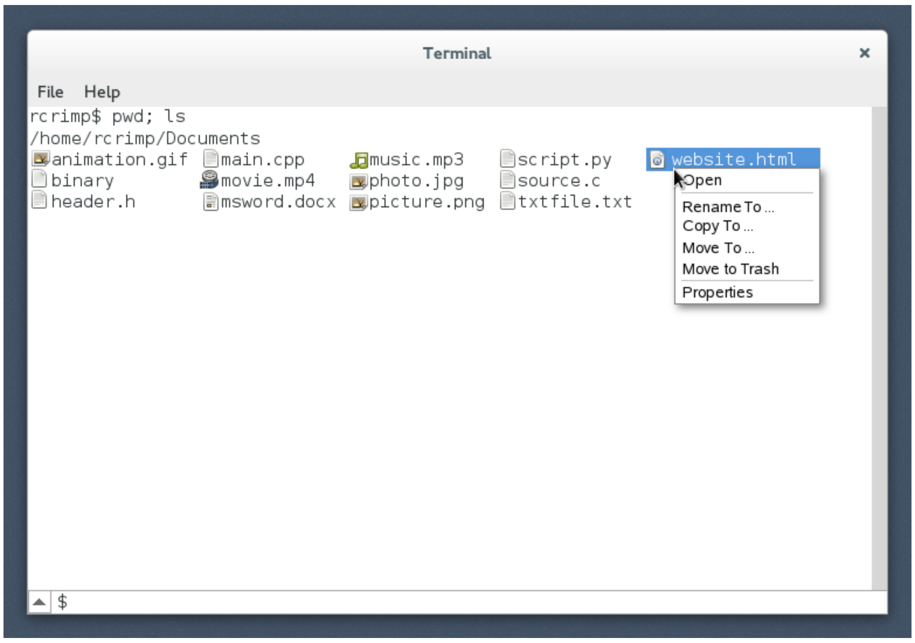
The flow of information through the shell's modules

Usability Features

The shell will allow for intuitive mouse interactions, these interactions will be very similar to the actions in a standard GUI OS environment (i.e. double click for open).

However, most of our actions wont actually perform the action outright, instead it will paste the command that would perform the requested action into the current prompt, i.e. clicking ”delete file” in a *nix environment will paste the command ”rm <file-name>” into the prompt, the user will then have to press ”return” to execute the command.

The purpose of this is to help the user if they do not know the specific text command, and then to teach that particular command to them.



```
rcrimp$ pwd; ls
/home/rcrimp/Documents
animation.gif  main.cpp     music.mp3    script.py   website.html
binary         movie.mp4    photo.jpg    source.c
header.h       msword.docx  picture.png  txtfile.txt
```

Fig 1: graphical ls with context menu

Our shell will come with an inbuilt ’ls’ function, designed specifically to aid beginners (which is replacable with the OS default ls/dir)
File-names will be preceded by a filetype icon, like a GUI shell, see (fig.1)

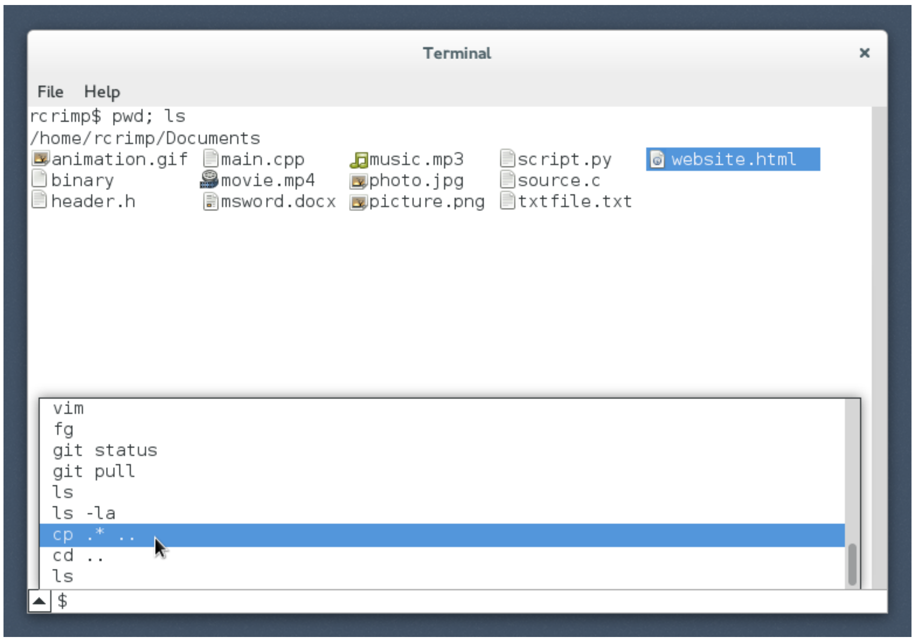
Intuitive directory navigation

Clicking on a directory will paste the command ”cd <dir-name>” into the prompt.
Double clicking a directory will execute the command ”cd <dir-name>”.
Right clicking on a directory will open a context menu (see fig.1), which will list basic directory commands e.g ”open (cd)”, ”move to .. (mv), clicking on these will paste the corresponding command into the prompt.

Intuitive file interaction

Single, double and right clicking on a file, will exhibit similar results to clicking on a directory. Single clicking on a file will paste the “<fil-ename>” into the current prompt. Double clicking on a file will open the file with the OS default application (if one exists).

Right clicking a file will also open a context menu with similar commands listed (move, rename, delete, open etc....)



```
rcrimp$ pwd; ls
/home/rcrimp/Documents
animation.gif  main.cpp    music.mp3    script.py    website.html
binary         movie.mp4   photo.jpg    source.c
header.h       msword.docx picture.png  txtfile.txt
```

```
vim
fg
git status
git pull
ls
ls -la
cp .* ..
cd ..
ls
$
```

Fig 2: interactive history

Interactive viewing of the command history

clicking the small arrow to the left of the prompt, will open a drop down menu (upwards), showing the last commands executed in ascending/descending? order (i.e last on bottom). The standard bash style keyboard shortcuts to access your history will also exist for the more advanced user. (up, down, "", str" etc...)

Directory Bookmarks

We will allow users to set temporary (and permanent) directory boomarks with a quick command.
executin "#work" will set a boomark in the current directory called "work", and successive execution of the command "#work" will change the users directory back to the first directory in which it was called.

i.e. quick navigation between commonly accessed directories when working on a project.

Tab Completion

The various forms of "Tab completion" tab completion will index: (–decide on an order of precedence–) $PATH Path-name completion in the working directory. File-name completion in the working directory. Path-name completion of all the parent directories of the working directory. Variable-name completion Man-page completion Command history wild card Tab-Tab lists all possibilities once for each completion, subsequent tabbing will cycle the prompt through the possibilities. inline prediction, like googles live search

same line Tab completion i.e like zsh Utilizes regular expressions Tab Tab, to list all possible completions

6 Script Syntax

patagraph of words explaining why we chose this langauge lexically easier to parse?or some shit like that

We will use end statements and colons to delimit program blocks.

Keywords

and	fail	if	return
break	false	in	true
class	for	not	try
else	function	or	unicorn
end	global	print	while

Assignment operators

=	Simple assignment
+=	Add and assignment
-=	Subtract and assignment

Arithmetic operators

+	Addition
-	Subtraction
*	Multiplication
\	Division
%	Modulus
ˆ	Exponent

Comparison Operators

==	Equal
!=	Not equal
>	Left larger
<	Right Larger
>=	Left larger than or equal to
<=	Right larger than or equal to

Code Examples

foo function in C

```
void foo(int x) {
    if (x == 0) {
        bar();
        baz();
    } else {
        quz(x);
        foo(x - 1);
    }
}
```

foo function in unicorn

```
function foo(x):
    if x == 0:
        bar()
        baz()
    else:
        qux(x)
        foo(x - 1)
    end
end
```

7 Risk Analysis

We wanted to implement a proactive approach to dealing with risks as opposed to a reactive approach.

Our objective is to be able to avoid risk whenever possible, and to solve problems before they manifested themselves. This preparation would hopefully mean that we could respond to problems that did occur in a controlled and effective manner. We understand that risks evolve throughout the course of the project and so we will be constantly monitoring identified risks throughout the course of the year via a risk map to ensure that we are still keeping them at bay.

8 Project Schedule

Dependencies between activities - allocation of people to tasks, time until milestones

Monitoring the project and ourselves is an important way for us to anticipate future problems and gives us a chance to avoid them. Sticking to the Gant Chart, Pert Chart - make sure on schedule reporting - GIT hub - so every time we make a build we push it.

((How it will be monitored and when will reports be delivered))