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Proposal for Linux Teaching Website for 342 Students

Introduction

CSS342 students new to the UWB CSS curriculum will find the amount of information introduced within the course to be immense. Though the class has a focus upon data structures and algorithms, there are many other topics that are introduced but not thoroughly explained. One such topic is Unix, a very important concept to understand and know. This project aims to create a comprehensive, interactive beginner tutorial for CSS 342 or undergrad students.

Scope

The website focuses on basic commands with the intent of learning and the familiarization of Unix commands. The website is a beginner's course and will take approximately 3 hours to complete. The content will contain only the most essential concepts and information needed to grasp an understanding of what unix is, why it is used, and how to use it in a project setting.

Interactive

There have been many studies throughout the years on the effectiveness of active learning versus passive learning. Active learning, according to UC Berkeley, is an "instructional method that engages students beyond listening and passive note taking"[1]. In the case of this project, active learning is the interaction between the student and our website. While studying the material, students will be actively inputting answers, scrolling over different components to see explanations, and reflecting on their knowledge in the form of quizzes that contain multiple question types. The question types within quizzes will contain role play scenarios, short answers, multiple choice, and fill in the blank. Research studies have shown that active learning improves knowledge retention, critical thinking, and motivation more than passive learning which involves only reading [2]. Students become engaged and actively involved in the entire online learning process which makes them more eager to learn and to solve problems for themselves instead of relying on memorization and instruction. According to Soloman Andrew, the author of Automated Testing of Unix Command-line and Scripting Skills, his class had a better pass rate the semester when LinuxGym, an interactive software learning tool, was implemented [3].

Table 4. Results of questionnaire focussed on LinuxGym in particular.

	Statement	True	False
Q1	LinuxGym is more motivating to practice Linux than a written test.	26	1
Q2	LinuxGym is more motivating to practice Linux than a written assignment.	26	1
Q3	LinuxGym helped me to improve my Linux skills.	26	1
Q4	I prefer LinuxGym to a written test.	19	8
Q5	I prefer LinuxGym to a written assignment..	19	8
Q6	LinuxGym has given me an accurate idea of my Linux skills.	25	2
Q7	LinuxGym marking was consistent and fair.	19	8

Figure 1. LinuxGym impact on student learning

As can be seen, the majority of undergraduate students voted that LinuxGym inspired them to learn and practice Linux more. As also claimed by Coloman, LinuxGym decreased postgraduate students' failure rates from 30% to 50% to practically 0%. As a result, students were better at gauging their skills before an exam, and hence were more prepared for assessments in terms of the level of knowledge required of them [3].

Compared to the previous survey, which was filled by students before having LinuxGym, the responses of students were neutral for learning LINUX commands.

Table 1. Generic university questionnaire

	Statement
Q1	I found the assessment fair and reasonable.
Q2	My learning experiences in this subject were interesting and thought provoking.
Q3	There were appropriate resources available to support

	the subject.
Q4	I received constructive feedback when needed.
Q5	Overall I am satisfied with the quality of this subject..

Table 2. Student responses to questions in Table 1, before introduction of LinuxGym

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Average Response
Q1	24	30	21	15	9	Neutral
Q2	20	43	11	11	14	Neutral
Q3	25	31	25	8	11	Agree
Q4	17	46	14	11	11	Neutral
Q5	14	31	22	17	17	Neutral

Figure 2 response of Students to the generic questionnaire

To sum up, Interactive learning encourages students to become engaged and actively participating in the entire learning process. It sparks a desire to learn and to solve problems for themselves rather than relying on the concept.

Pre-test - survey on the thesis " Is interactive Learning impact students Learning"

Please use UW email to access and see the responses:
https://docs.google.com/forms/d/1V2wld4O3Z3M8gT_bTer-v7hWi8zwxwMoOv2QZ6z6mFk/edit#responses

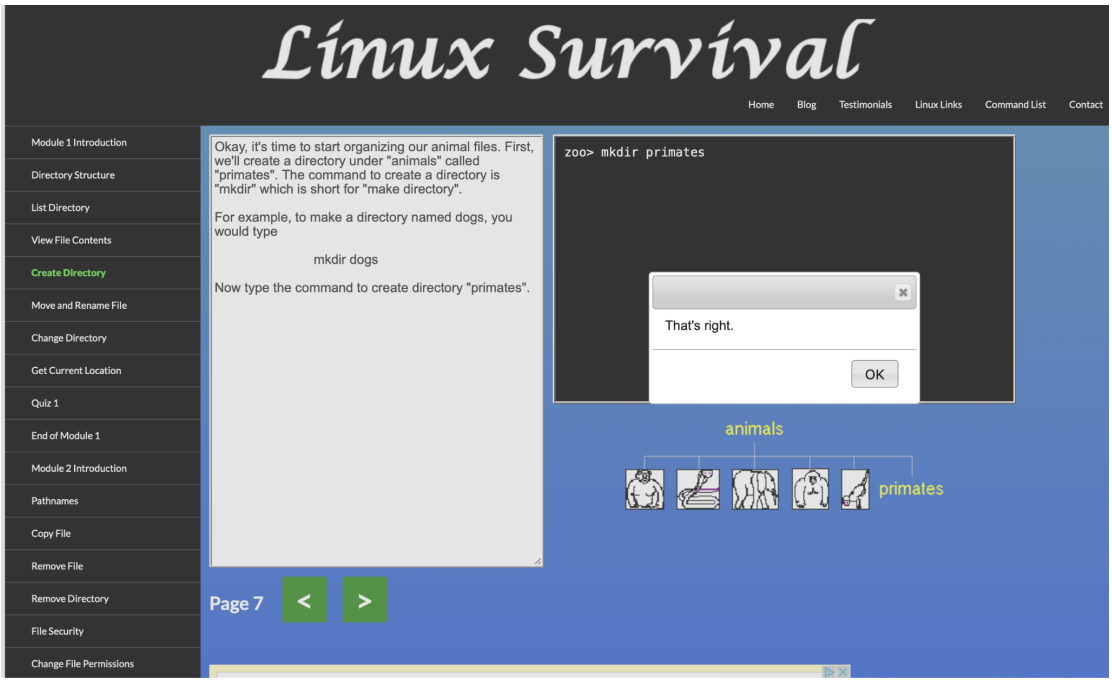
According to the survey, the majority of students prefer interactive learning as seen in the bar graph. In the comments provided by CSS students, there is mention of preferences for learning styles depending on the person, but it seems many prefer interactive learning over non-interactive learning.

In conclusion, interactive learning is good for students if they want to learn in-depth about Unix/Linux commands. On the other hand, if students are familiar with Unix/Linux commands and they just want to quickly look at the documentation or syntax, students would prefer text-based information.

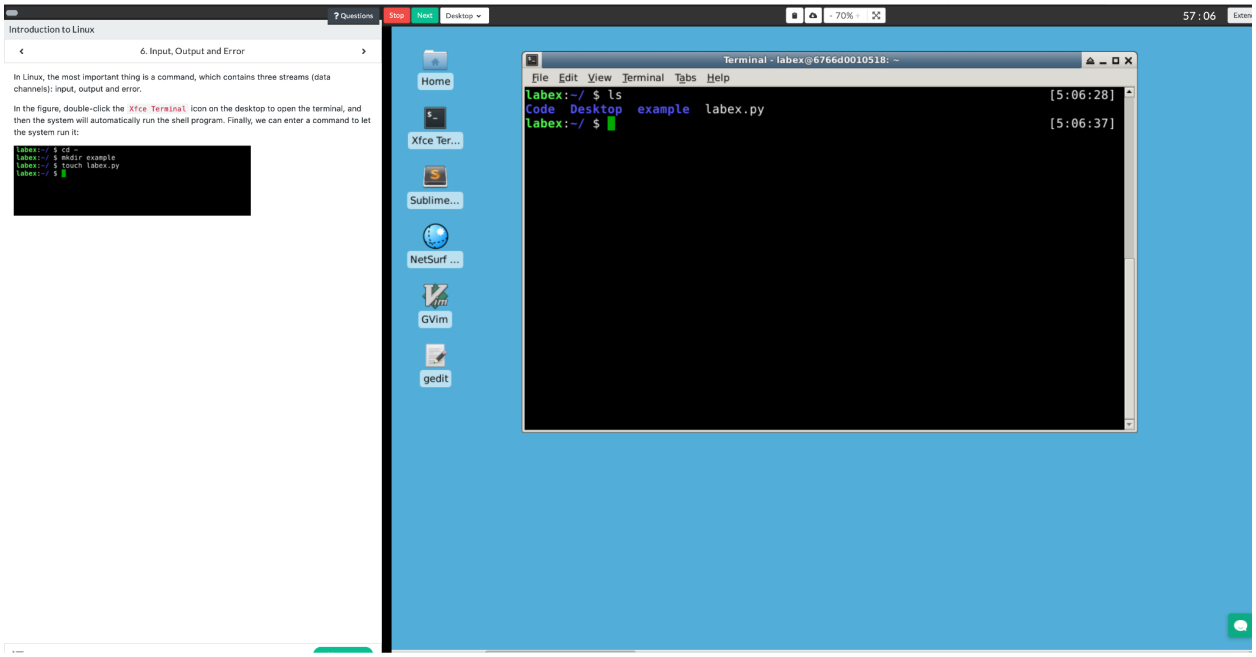
Tutorials

Compiled below contains lists of existing interactive and non-interactive websites. The interactive websites have similar designs. Each contains a CLI where Unix commands can be executed, as well as a concept section that consists of information important to the topic. Furthermore, instructions and small assignments help guide users towards participation and interaction. The non-interactive websites contain only text information that the user must read by themselves. Occasionally there are photographs or charts, but the majority of the content contains paragraphs of text information.

Interactive learning websites:



[Linux Survival | Where learning Linux is easy]



[LabEx - An Interactive Guide to Linux for Noobs - Powered by Virtual Machine]

Non-interactive (not much interaction)

- [Linux Tutorial For Beginners - 1 | Linux Administration Tutorial | Linux Commands | Edureka]
- [Linux Tutorial | A Basic Guide to Linux For Beginners (educba.com)]
- [Linux/Unix Tutorial - javatpoint]
- [Bash Tutorial: How to Use the Command Line in Linux, Windows, and Mac Terminal by FreeCodeCamp]
- [Command Line Crash Course by FreeCodeCamp]
- [Linux Tutorial | Linux Tutorial In 2021 - W3cschoool.COM]
- [The Linux command line for beginners | Ubuntu]

Possible Topics the Course will Cover

- Unix introduction
- File Management
    - Directory structure
    - List directory
    - View file contents
    - Create a directory
    - Move and Rename files
    - Get current directory location
    - Change directory

    - Copy file
    - Remove file
    - Remove directory
- File Security
    - File Permissions
    - Wildcard
    - Group memberships
- Basics Information
    - Manual Pages
    - User information
    - Find File
    - Concatenate files
    - Redirect output
    - Print
- Environment
- Advanced commands (optional)

Interactive Assignments and Practice

    - Fill in the blank.
    - Hand on practice (Coding Tasks).
    - “Text based adventure” with multiple choice

Pre-Test and Post-Test

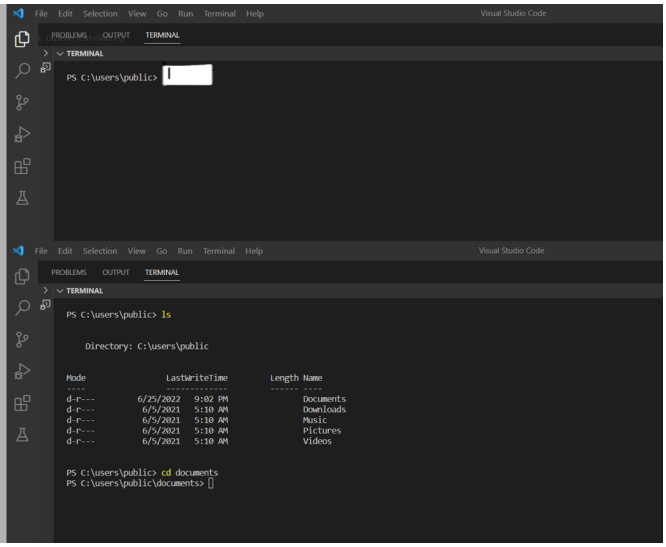
In Order to demonstrate how much students have learned throughout the course, we are going to have pre-test and post-test assessment for the learners:

- **Pre-Test:** Small surveys or quizzes: evaluate how they are familiar with the UNIX command.
- **Post-Test:** small quizzes at every end of the module and at the end of the course we will have a comprehensive quiz.

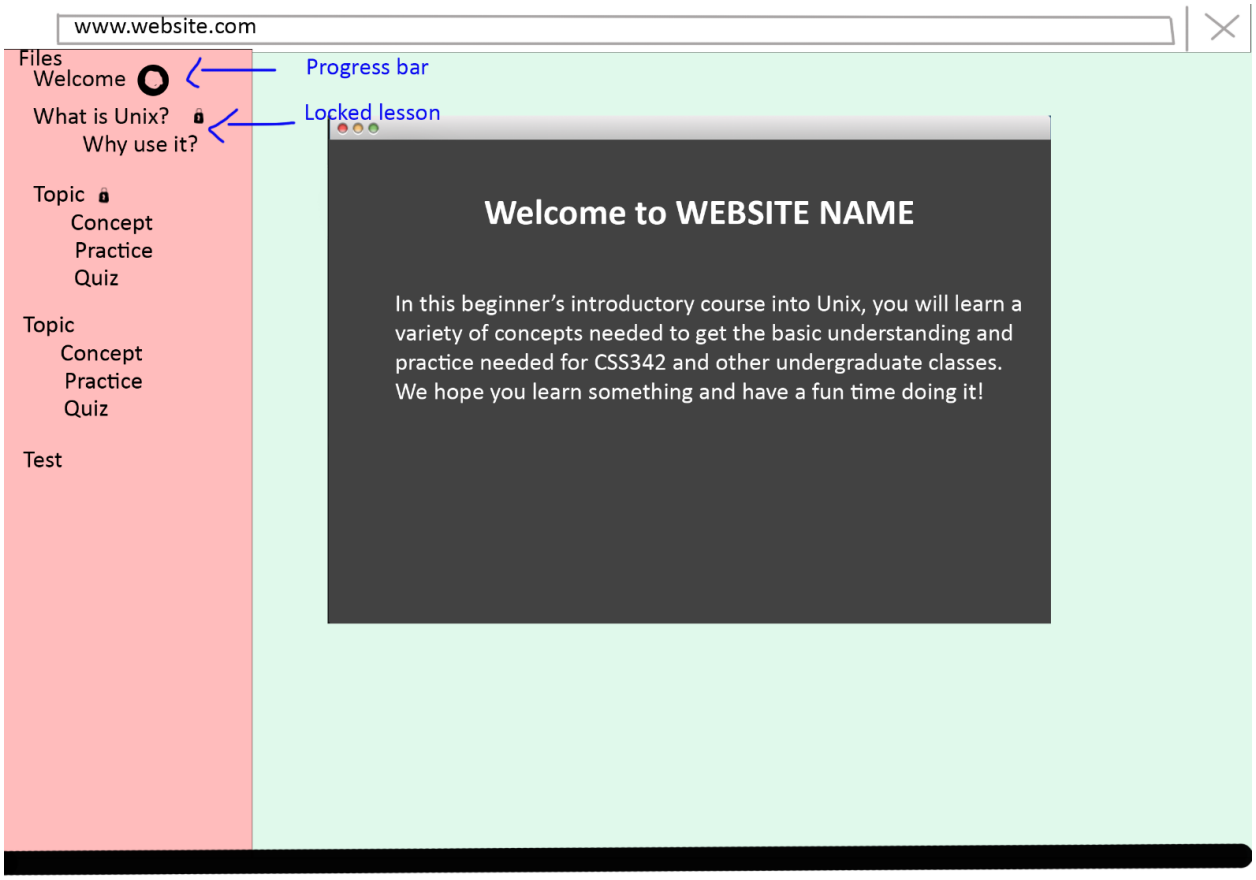
For reflection on parts where they may be struggling, depending on their success in the quizzes and tests, wrong answers to questions will result in indications to where the information lies for more studying and additional external resources will be cited.

Storyboard

You have aquired someone's computer and would like to do some snooping. The first action you should take is to first see all the files and directories. The command to see what files and directories there are is ls. This comand.....[explanation]. Go ahead and try the command and see what items this computer holds.



This is how users will learn different commands and see how they work.



You are a software developer and are developing a calculation application for your company. You are familiar with Unix and prefer using it over your computer GUI. You need to access a specific file that will contain your application, but you have forgotten what the file is called. You know you would remember it if you saw it. Which commands will allow you to see all the files, access a specific file, and create a new file within it? Choose all that apply.

ls, cd, cat ○ cp, ls, vim ○

ls, cd, touch ○ choice 4 ○

This is where a scenario is explained. Out of the listed accepted commands, how would you complete the task? Type the commands here seperated by a comma and space.

***Short answer will have students compare answers to ours and reflect**

Your are on your way to save the princess but you were captured and are now in an unfamiliar place. Look to see where you are.

To the left of you, you see a wooded forest and to the right you see a small hut. You decided to head towards the hut.

There will be a small text based adventure that will act as a comprehensive practice for many commands. The adventure will tell the user to do something and the user will have to insert the right command for them to continue. If the command is wrong, an error message will be shown.

Resources

[1] Active Learning | Center for Teaching & Learning (berkeley.edu)

[2] Passive vs Active Learning/Memory: What's Most Effective? - MosaLingua

[3] LinuxGym