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Subject: Problem Statement and Background History for Jupyter Notebooks and Command Line Interfaces User Guide
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I. Problem Statement

Many courses in Cornell College of Engineering introduce programming using Jupyter Notebook and require students who have no computational background to use command-line interfaces (CLIs) to download software for the course. These tools are essential for students new to programming, but there is a significant lack of documentation on these interfaces, especially from Cornell.

Similarly, CLIs have become increasingly popular among programmers, and software engineers are expected to be familiar with it [12]. CLIs are extremely powerful in the way that some commands can delete all existing data from a computer [4]. Understanding the basic CLI commands can be very useful to avoid misuse. Proper use of CLIs give users more control over the computer and operating system and execute tasks faster [5, 6]. As aspiring software developers, it's important for students to familiarize themselves with CLIs [7].

II. Background and History of Jupyter Notebooks and CLI

Jupyter Notebooks and CLI are both great tools for anyone interested in the field of Computer Science [13]. Jupyter Notebook not only is used in many classes at Cornell, but also is the standard for the Data Science industry [1, 2, 3, 14]. It can help make technical communications much easier, as it can bridge the gap between showing code and describing results [11].

Our goal is to provide students with a resource that can help guide them to properly set up and use these tools effectively: we plan to start with Jupyter Notebook because it's less intimidating to learn, and then integrate CLI into jupyter learning, and also go deeper into CLI.

III. Current User Documents and Important Areas to Improve

There is an ever growing importance for understanding how to properly code and analyze results [7, 14]. The current resources available are lacking in some areas, and we plan on improving the user experience in some of these areas:

- Jupyter Notebook allows embedded multimedia for illustrative explanations; furthermore, it contains HTML and LaTeX components in its markdown blocks [8]. As such, formatting these cells to show exact formulas, links, or other content can enhance the learning experience. However, the only resources available are random websites that list information without proper organization.
- Jupyter Notebook has access to countless useful Python packages [9, 10, 17]. There are limited guides focused on how to import and install packages, especially for MacOS. For each individual package, the official documentation can also be intimidating for someone unfamiliar with programming.

Similarly for CLI, a lot of improvements are needed for documentation. There is barely anything specific that guides users through how to complete basic operations such as download packages and running code, especially for MacOS [15, 16]. Finally, resources that integrate both of these important tools are practically nonexistent.

IV. Service Ecology: Props, Process, and People for the User Document

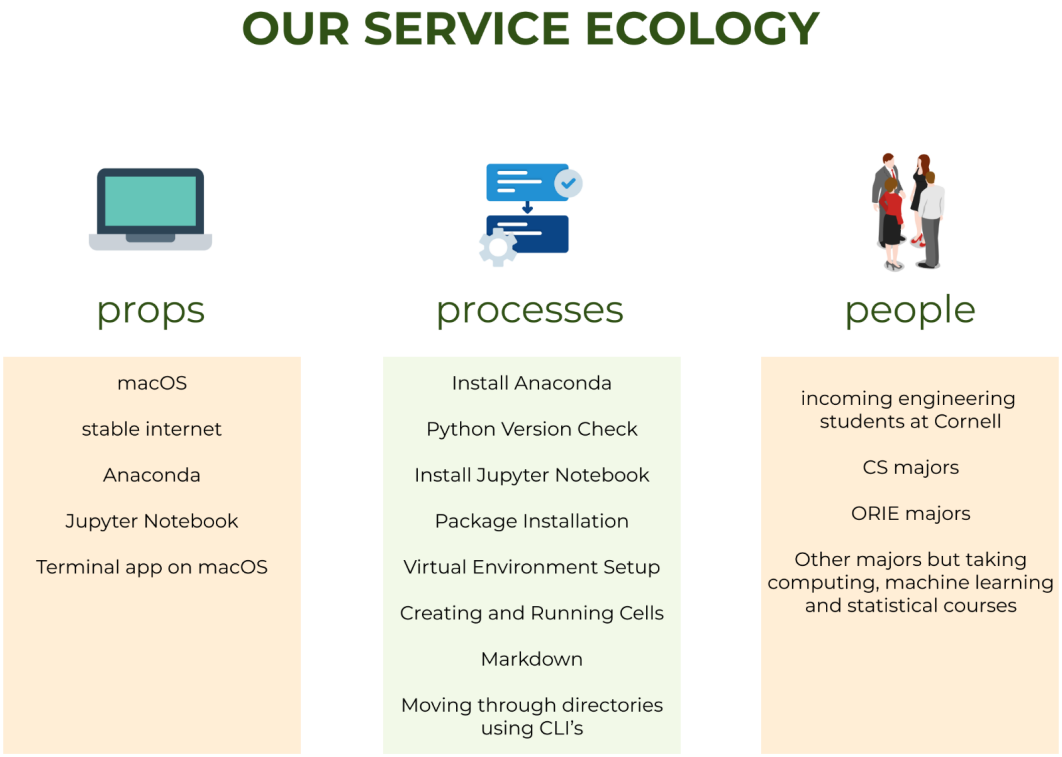

Fig. 1. The Service Ecology of the User Document

We're using the Jupyter Notebook interface to introduce users to the basics of UNIX terminal and Jupyter notebook, and props include the things needed for someone to follow our tutorial. And we would walk through the processes described in Figure 1. More specifically, for the CLI's, we will include:

- Access information about computers - current processes, memory, etc.
- EMAS/VIM, document editing

Lastly, the intended audience is incoming Cornell Engineering students, but can be used by anyone interested in beginner programming.

V. Service Blueprint

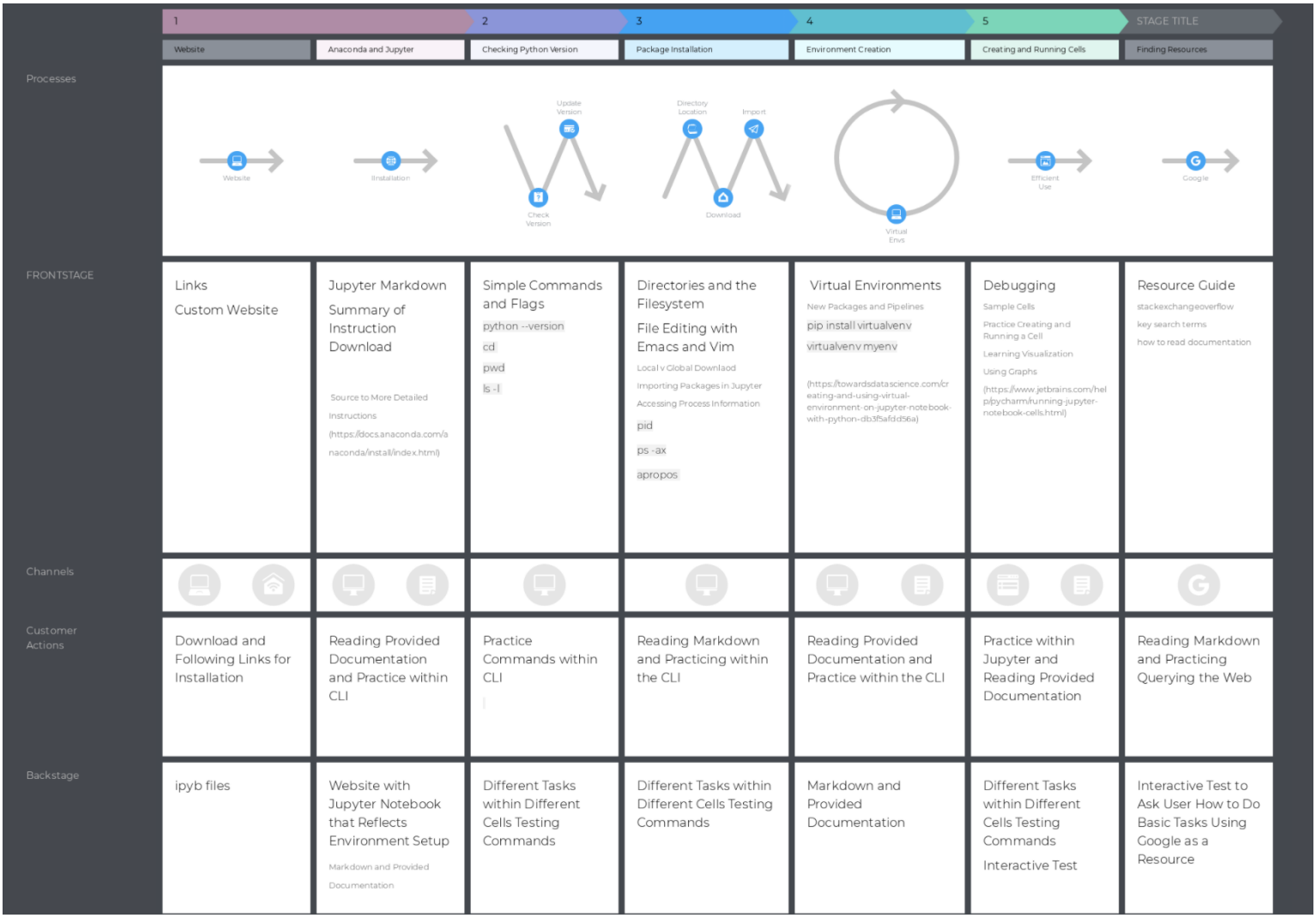

Fig. 2. The Service Blueprint of the User Document

When a user first visits our website, they will follow the instructions to download and install software required to run Jupyter Notebook. More specifically, they will be guided through a simple to understand but detailed process of installing Anaconda and launching Jupyter Notebook on their system. The user can then choose to learn about different functionalities available in Jupyter Notebooks including using CLI commands by doing the tutorials linked on the website. These tutorials will be .ipynb files that the user can download and launch on Jupyter Notebook using the steps they've just learnt while installing the app. Figure 2 describes the customer journey along with the frontstage which represents the different user-interface interactions. The backstage represents the different processes the user will be implementing as a result of their fronstage journey. Users will require a macOS device in order to follow our tutorials.

We decided on this since our team members all utilize macOS devices, and agreed that creating a user document on what we're acquainted with is the best way to share our knowledge.

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