



File System Redesign

Competitive Analysis

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Executive Summary

A user journeys through their data in a file system using 5 high-level activities: **Discovery, Sourcing, Customization, Navigation, and Management**. In this analysis, we examine competitors relevant to JupyterLab, and explore how they address these high-level activities.

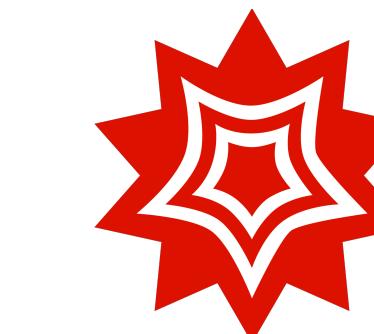
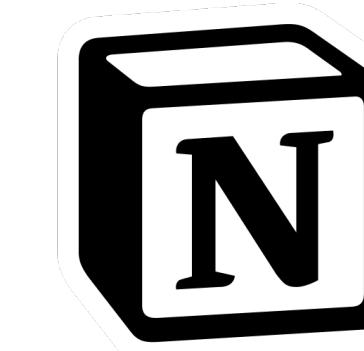
Our analysis reveals that in JupyterLab, several of those high-level activities are affected by a core underlying problem: JupyterLab's inability to see any file structure above and/or outside of the directory in which JupyterLab is running. While this appears to be a technical constraint of JupyterLab, providing the user visibility into this limitation will aid users in understanding the layout and capabilities of the file system(s) at play, as well as highlighting areas where JupyterLab has opportunities to bolster their experience.



Background

JupyterLab is at a crossroads with its file system. The existing File Browser has constrained functionality and is scheduled for replacement by the embryonic File Tree. However, the File Tree is an experimental plugin still in its development stage. JupyterLab needs UX guidance to merge File Browser and File Tree into a next-level file system that will help JupyterLab attract the “mid-level” users that it is targeting.

Our team attacked this problem by conducting a competitive analysis of JupyterLab’s existing File Browser system versus the file systems deployed by competitors and influencers. Although JupyterLab occupies a unique space with few clear-cut direct competitors, JupyterLab is a flexible tool that touches many other spaces. Our team leveraged this flexibility, conducting a free-range exploration of file systems employed by the wide variety of software tools shown below:



Methods

Our research revealed a core feature set shared by most of the competitors in our analysis. We honed that core feature set into five top-level user activities, representing the user's chronological journey through their file system: **Discovery, Sourcing, Customization, Navigation, and Management.**

We then broke each of these top-level activities down into smaller, more discrete functions that a user employs in conducting the relevant top-level activity. For each of these discrete functions, we chose three competitors whose features were most applicable to JupyterLab's use case. With regard to each relevant feature, we looked at how JupyterLab's current File Browser stacks up against each of these three most-relevant competitors.

Findings

Our research ultimately reveals that JupyterLab's File Browser suffers from a “**location blindness**” arising out of its in-file-system deployment. JupyterLab treats the directory from which it is running as the top-level directory of the user’s file system, whether or not that is in fact the true top-level directory of the host file system. This problem is particularly acute in the Sourcing and Navigation activities, although it casts a shadow over the Discovery, Customization, and Management activities as well – it is difficult for a user to discover, customize, or manage data that appears to be out of reach.

Providing the user visibility into this technical limitation will in turn drive other UX choices that will help JupyterLab leverage other file-system best practices revealed by our analysis below.

File System Top-Level Activities & Constituent Functions

Discover

How users locate files

Search

Google Drive

Finder

Spotify

Sort/Filter

Notion

Google Drive

Lightroom CC

Content Details (metadata)

Google Drive

Spotify

Mathematica

Sourcing

How users access files

Authentication

Tableau

Mathematica

Google Drive

Segmentation

Lightroom CC

Tableau

Finder

Content Previews

Tableau

Google Drive

Pinterest

Customize

How users set up workspaces

Viewing Options

Finder

Google Drive

Tableau

Relationship Visualization

Spotify

Pinterest

Lightroom CC

Navigate

How users orient themselves

Location Awareness

Google Drive

Pinterest

Mathematica

Wayfinding

Google Drive

Notion

Google Chrome

Concurrent Browsing

Finder

Google Chrome

Tableau

Manage

How users maintain their work

Organizational Freedom

Pinterest

Google Drive

Spotify

Revision History

Mathematica

Google Drive

Lightroom CC

Sharing Permissions

Google Drive

Pinterest

Notion

Discover

How users locate files

Discovery is the process by which a user locates files. The discovery process is driven by three key features that differentiate the competitors: **search functionality, sort / filter functionality, and the ability to view content details / metadata.**

Our findings show that JupyterLab is lagging significantly behind competitor Google Drive in the search and view content details features. Additionally, competitor Notion offers a novel approach to the sort / filter functionality that reveals noteworthy UX opportunities for JupyterLab.

Search

Sort & Filter

Content Details



Discovery - Search

Company & Rank

Google Drive

Mac Finder

Spotify

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Indirect

Indirect

Influencer

Client

Feature Approach

Enables users to search via file names, file or folder types, owner, location, date modifications, keywords, and more.

Enables users to search via keywords, file names & file types.

Enables users to search music and podcasts via artists, albums, songs, podcast names, and podcast episodes. Users can also discover new content via browse pages and curated playlists.

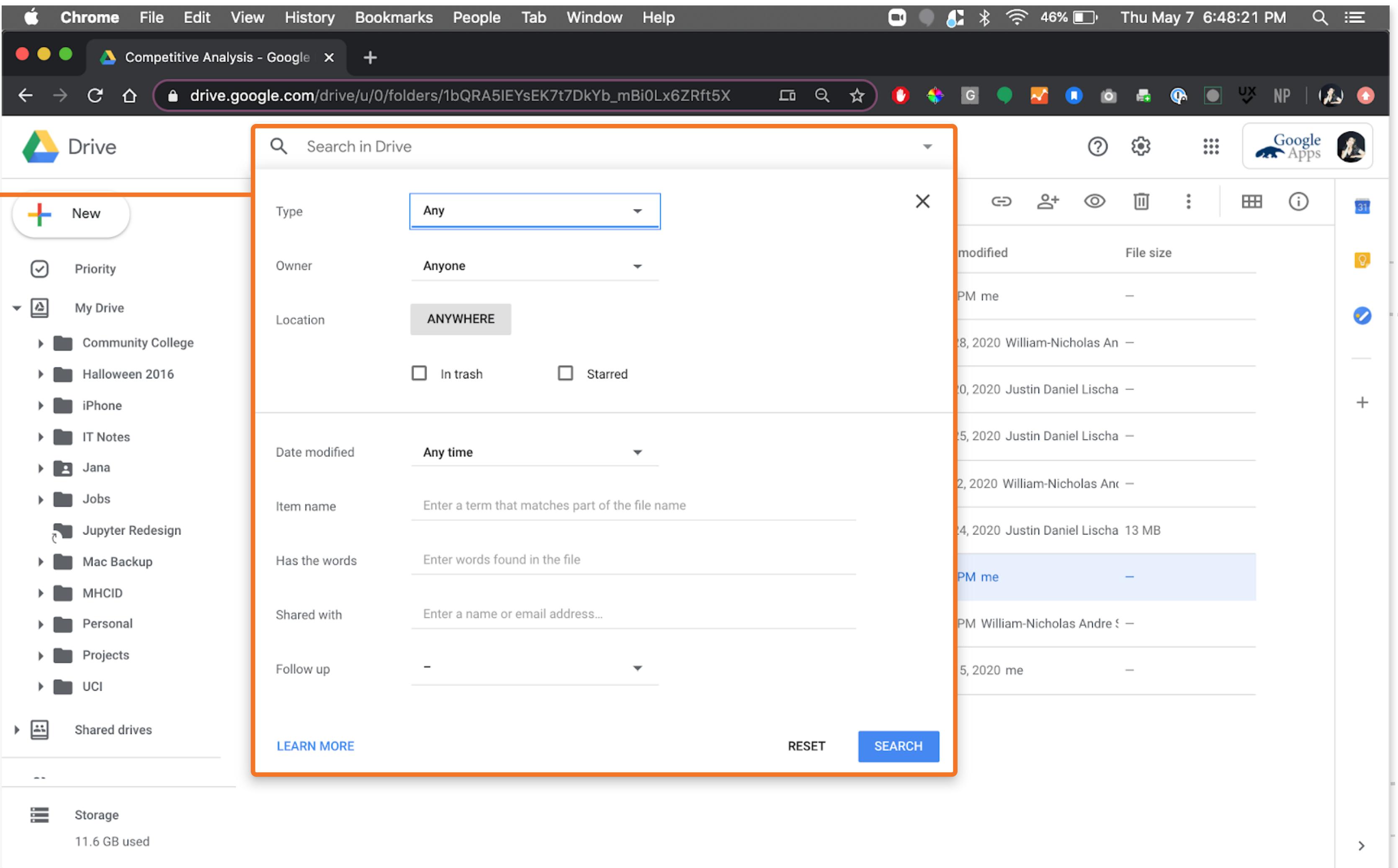
Labors under an inflexible search functionality that is difficult to find, meant for commands rather than files, and dependent on advanced-level knowledge of JupyterLab.

BEST IN CLASS

Discover - Search

Google Drive

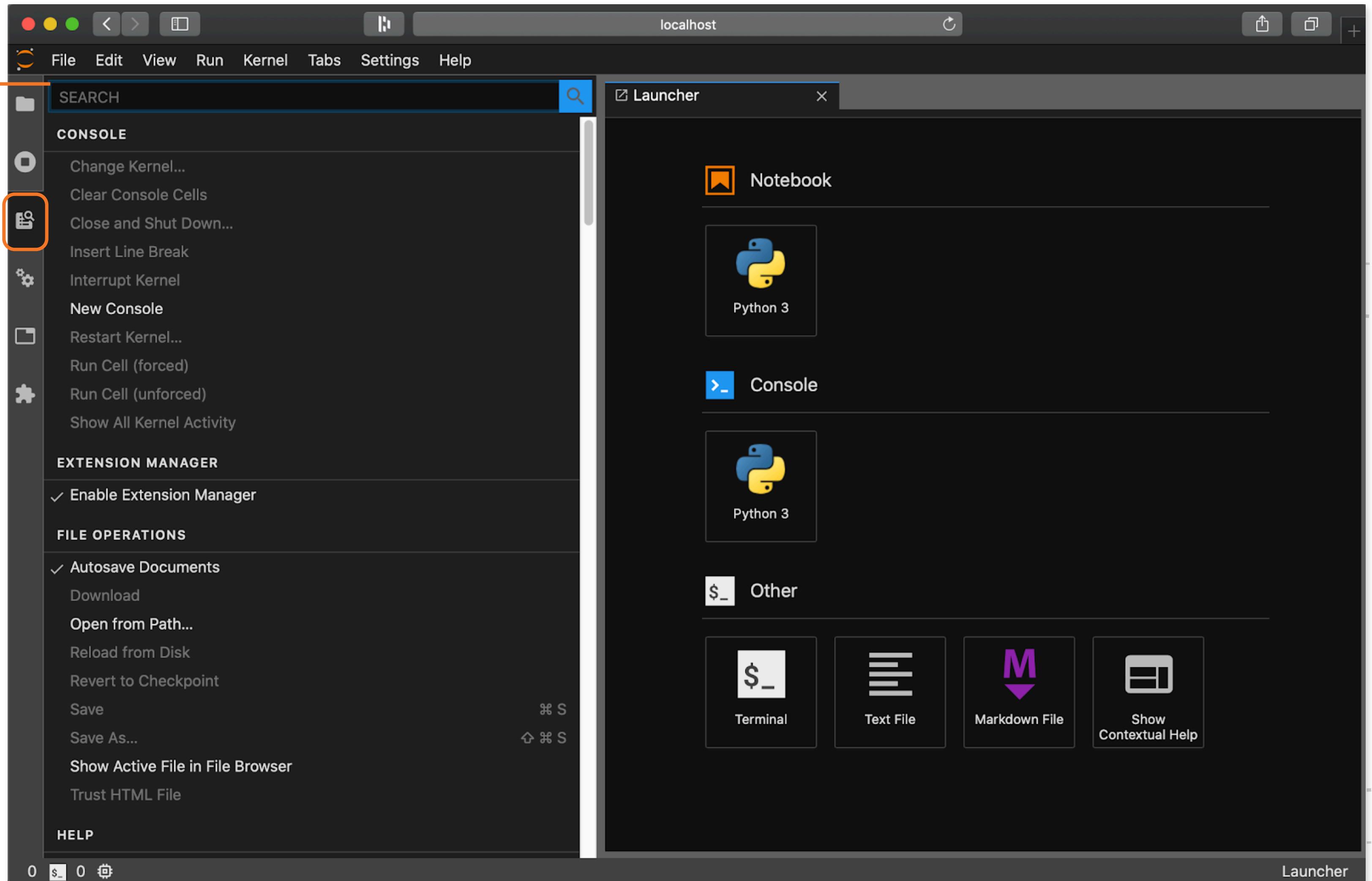
Flexible, easily-accessible search functionality allows user to search on multiple different properties within Google Drive simultaneously



The screenshot shows the Google Drive interface in a web browser. A search dialog box is open in the center, highlighted with an orange border. The dialog box contains fields for searching by Type (set to Any), Owner (set to Anyone), Location (set to ANYWHERE), Date modified (set to Any time), Item name, Has the words, Shared with, and Follow up. At the bottom of the dialog are 'LEARN MORE', 'RESET', and 'SEARCH' buttons. To the left of the dialog is the left sidebar of Google Drive, showing sections like 'New', 'Priority', 'My Drive' (with sub-folders like 'Community College', 'Halloween 2016', 'iPhone', etc.), 'Shared drives', and 'Storage'. To the right of the dialog is the main content area displaying a list of files with columns for 'modified' and 'File size'. The top of the screen shows the browser's toolbar and the system status bar.

JupyterLab

Search functionality is hidden under
“Commands” menu, and meant for searching
menu of commands -- not user’s files or data.



Discover - Sort & Filter

Company & Rank

Notion

Google Drive

Lightroom CC

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Influencer

Indirect

Influencer

Client

Feature Approach

Enables users to sort via relevant categories (e.g. "Task Priority", "Creation date", "Name", and more).

Enables users to filter via relevant categories (e.g. "Assigned tasks", "Tags", "Document type", and more).

Also enables users to create their own custom categories that they want to filter/sort.

Enables users to sort via relevant pre-defined categories (e.g. "Name", "Last modified"), and to filter by "Last modified" user.

Enables users to sort via relevant pre-defined categories (e.g. "Edits", "Albums", and "Imports").

Threadbare sort / filter functionality only offers predefined "name" and "last modified" categories.

Discover - Sort & Filter

Notion

The screenshot shows the Notion interface with the "JupyterLab: Research" template selected. In the top right, there are "Properties", "Filter", "Sort", "Search", and "New" buttons. A red box highlights the "Filter" button, which is currently active, showing a dropdown menu with "Type", "Is", and "Competitive Analy..." options. Below the toolbar, a card for "Competitive Analysis" is displayed, featuring sections for "Overview", "Direct Competitor", and "Indirect Competitor". A large orange arrow points from this screen to the next one.

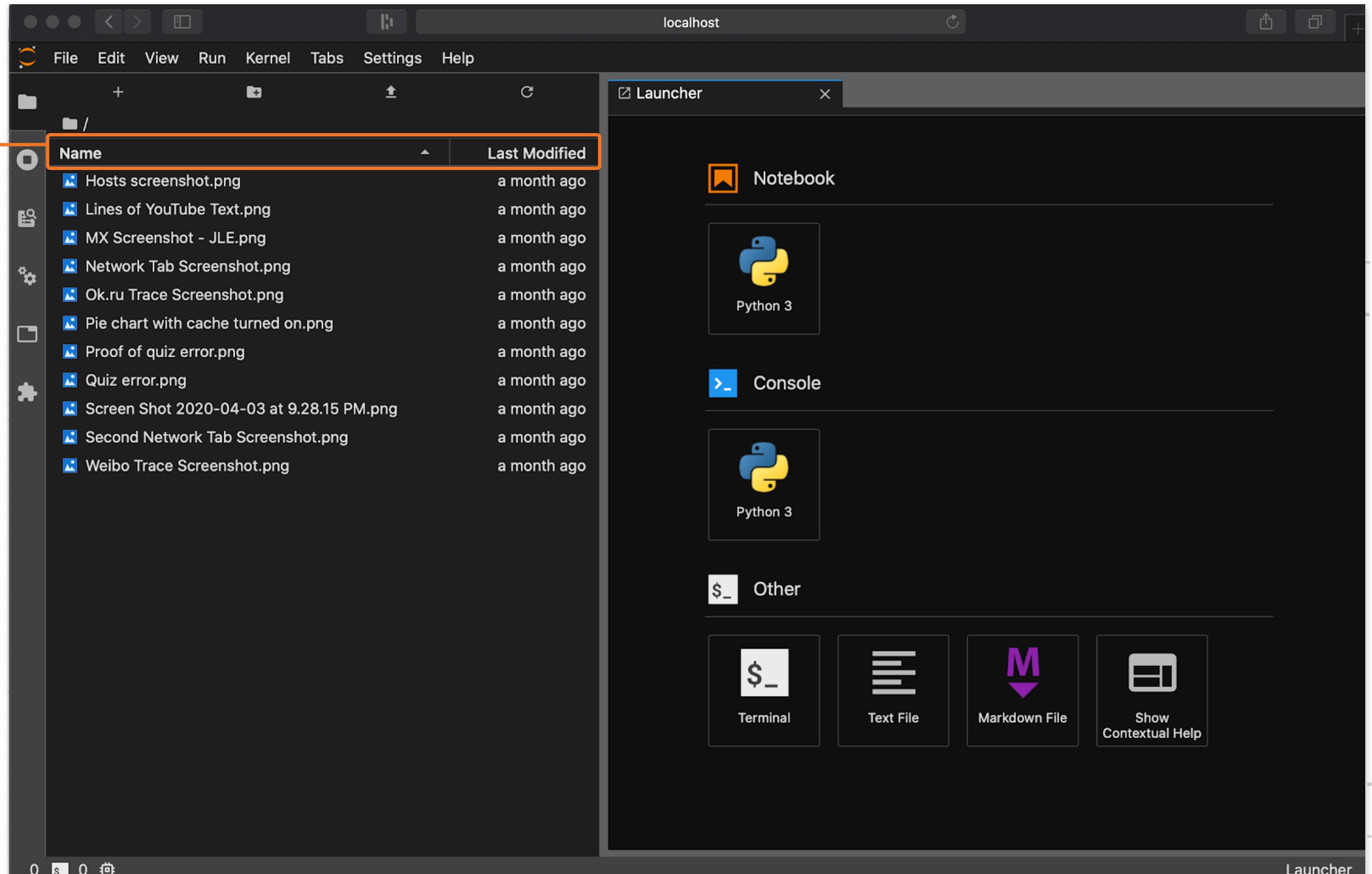
This screenshot shows the same Notion interface after the "Sort" button was clicked. A red box highlights the "Sort" button, which is now active, showing a dropdown menu with "Aa Name" and "Ascending" options. The "Competitive Analysis" card has been sorted by name, with "Mathematica" at the top. A vertical red line connects this screen to the text below.

Users can create customized sort and filter properties to maximize feature utility on varying data types.

Users can then sort and filter on those predefined or custom categories, in any manner.

JupyterLab

Sort & filter functionality is narrow and brittle;
only “name” and “last modified” options
available.



Discover - Content Details

Company & Rank

Google Drive

Spotify

Mathematica

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Indirect

Influencer

Direct

Client

Feature Approach

Enables users to view high-level details about folders and files within their drive (e.g., "Location", "Type", "Owner", "Last modified", and "Permissions").

Groups listening content such as Playlists; displays high-level details about music and podcast episodes (e.g., "Descriptions", "Length", and "Progress").

Enables users to view high-level details about folders and files within their cloud (e.g. "File Type", "Owner", "UUID", "Path", and "Permissions").

Lacks folder or file content details, leaving user without ready visibility into file and folder type, location, owner, last modified, etc.

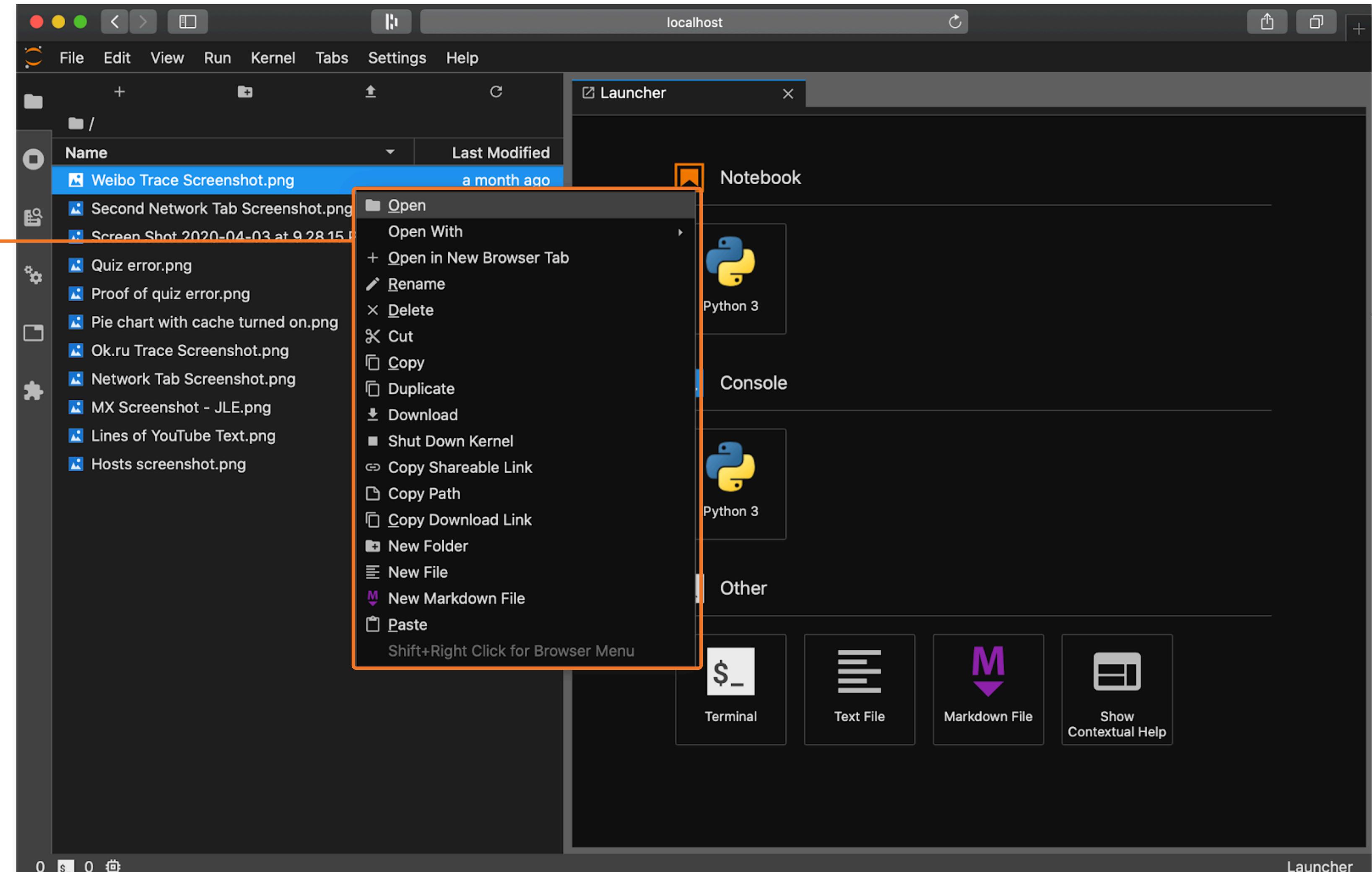
Google Drive

The screenshot shows the Google Drive web interface. On the left, there's a sidebar with navigation links like 'New', 'Priority', 'My Drive' (expanded to show 'Community College', 'Halloween 2016', etc.), 'Storage' (11.6 GB used), and 'Bookmarks'. The main area shows a list of files and folders under 'Shared with me > ... > Research > Competitive Analysis'. A specific folder named 'Competitive Analysis' is selected. A modal window titled 'Competitive Analysis' is open on the right, showing 'Details' tab (selected) and 'Activity' tab. The 'Details' tab displays information such as Type: Google Drive Folder, Location: Research, Owner: me, Modified: Apr 17, 2020 by me, Opened: 7:06 PM by me, and Created: Apr 17, 2020 with Google Drive Web. An orange callout box points to the blue 'i' information icon in the top right corner of the main toolbar.

Clicking the “information” icon allows users to view useful high-level folder and file details, as well as activity.

JupyterLab

User lacks easy access to file details via common methods such as right-click.



Sourcing

How users access files

Sourcing is the process by which a user accesses the files that they have discovered. The sourcing process is driven by three key features that differentiate the competitors: **authentication, segmentation, and content previewing.**

Our findings show that JupyterLab falls short of competitor Tableau as regards authentication and content previewing. JupyterLab is also well behind competitor Lightroom in its data segmentation capabilities.

Authentication

Segmentation

Content Preview



Sourcing - Authentication

Company & Rank

Tableau

Mathematica

Google Drive

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Direct

Direct

Indirect

Client

Feature Approach

Enables users to connect to remote servers with their unique credentials from within the application.

Enables users to connect to “Remote Kernels” with an ssh key and host name. Also enables users to connect to the cloud with unique credentials.

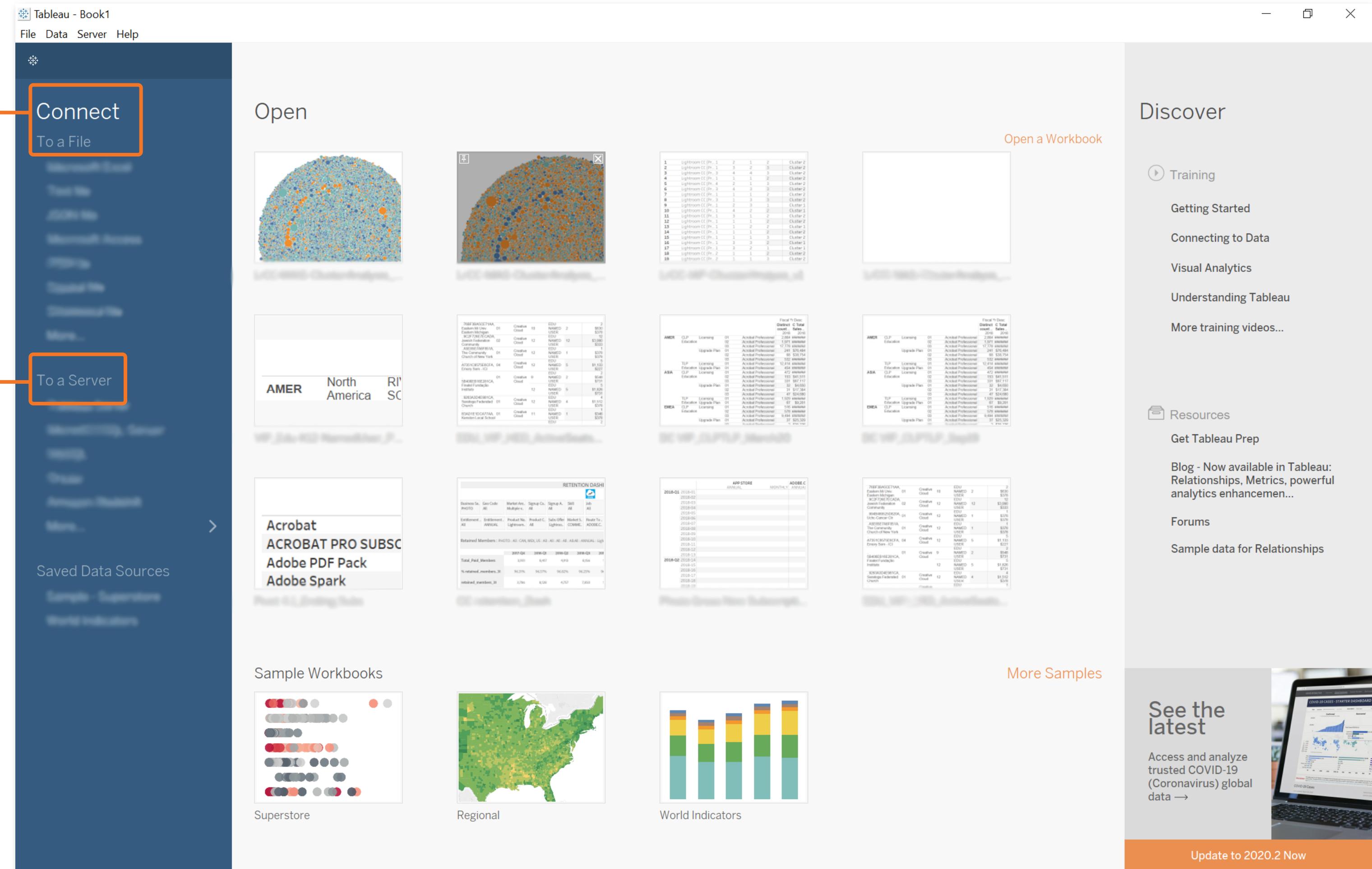
Enables users to change their “File Location” and connect to network shares and mapped network drives.

Authentication is handled out-of-band by requiring the user to pre-navigate to the location where JupyterLab will launch, creating a fractured user experience.

Sourcing - Authentication

Tableau

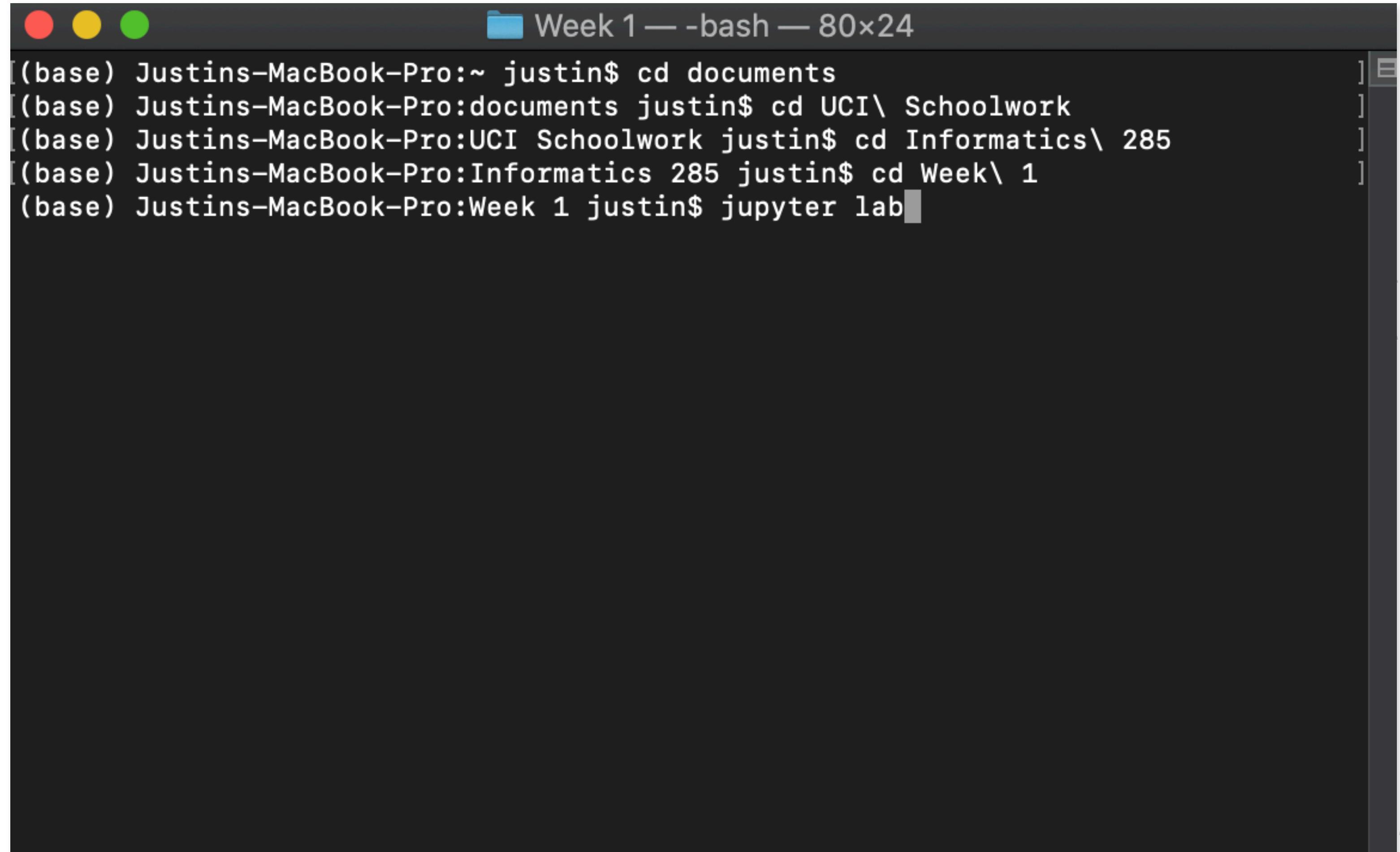
Upon launch of the desktop app, users are prompted to Connect to a data source or open a recent workbook.



Users are prompted to sign in with their unique credentials and are granted access if successful.

JupyterLab

User must manually navigate to and authenticate into the JupyterLab launch location, creating seams in the user experience.



```
(base) Justins-MacBook-Pro:~ justin$ cd documents
(base) Justins-MacBook-Pro:documents justin$ cd UCI\ Schoolwork
(base) Justins-MacBook-Pro:UCI Schoolwork justin$ cd Informatics\ 285
(base) Justins-MacBook-Pro:Informatics 285 justin$ cd Week\ 1
(base) Justins-MacBook-Pro:Week 1 justin$ jupyter lab
```

Sourcing - Segmentation

Company & Rank

Lightroom CC

Tableau

Mac Finder

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Influencer

Direct

Indirect

Client

Feature Approach

Categorizes files temporally and via content analysis (facial recognition).

Categorizes databases by overall location (e.g., local or remote).

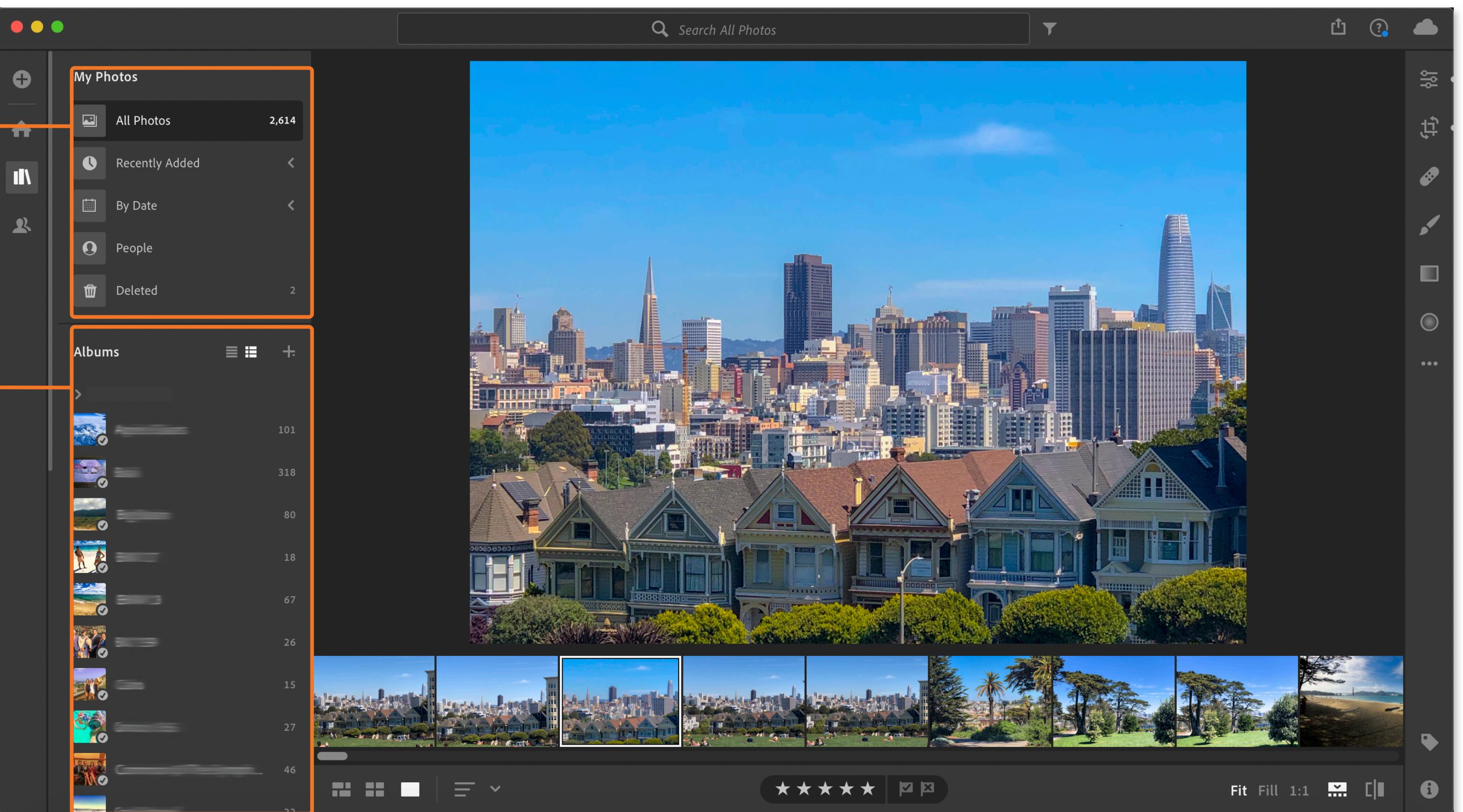
Categorizes files by location within the entire OS directory.

Categorizes files by location of and within the particular directory from which JupyterLab was launched.

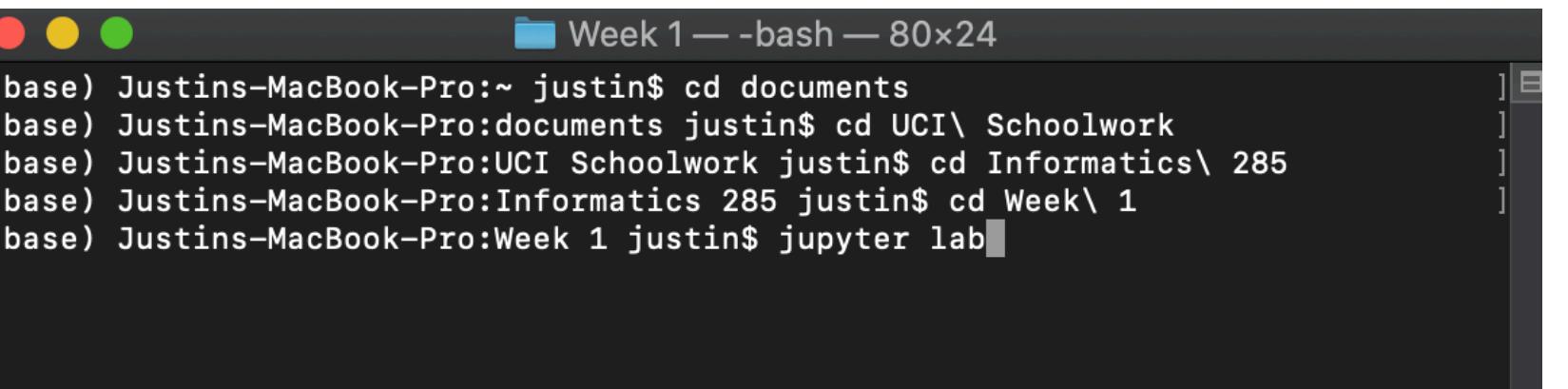
Lightroom CC

Prioritized real estate in the sidebar menu enables users to access 'files' by categories, regardless of location.

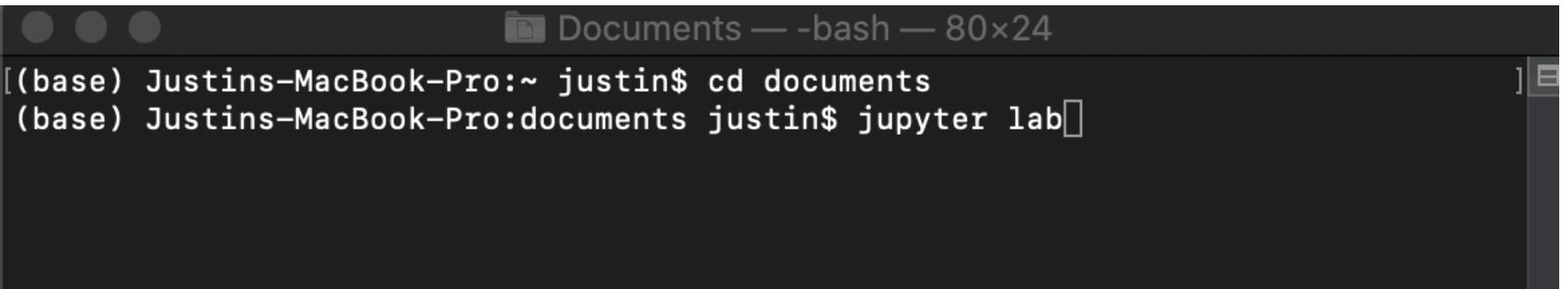
The larger sidebar pane is dedicated to the albums (folders), which follow a tree-like structure.



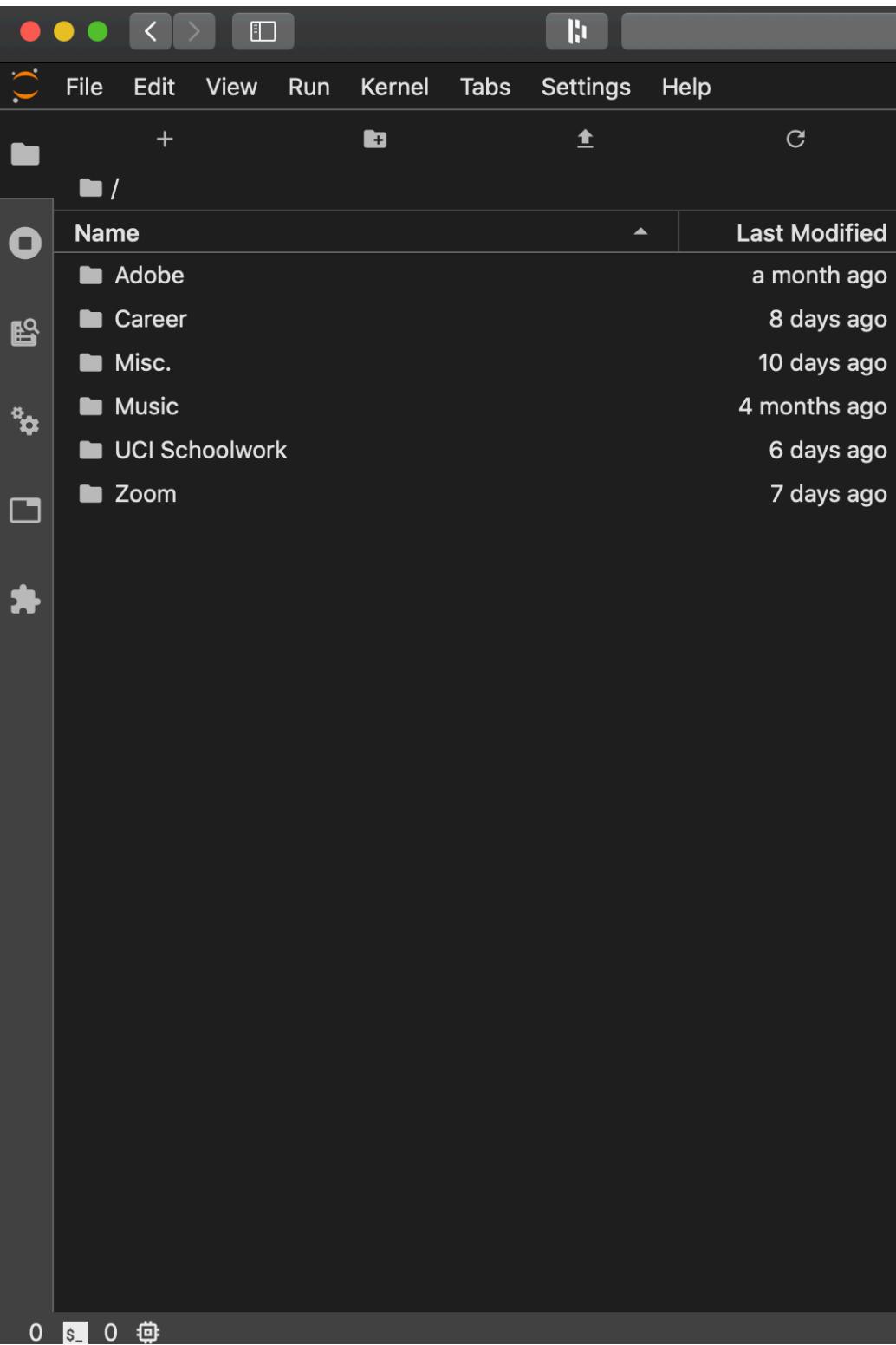
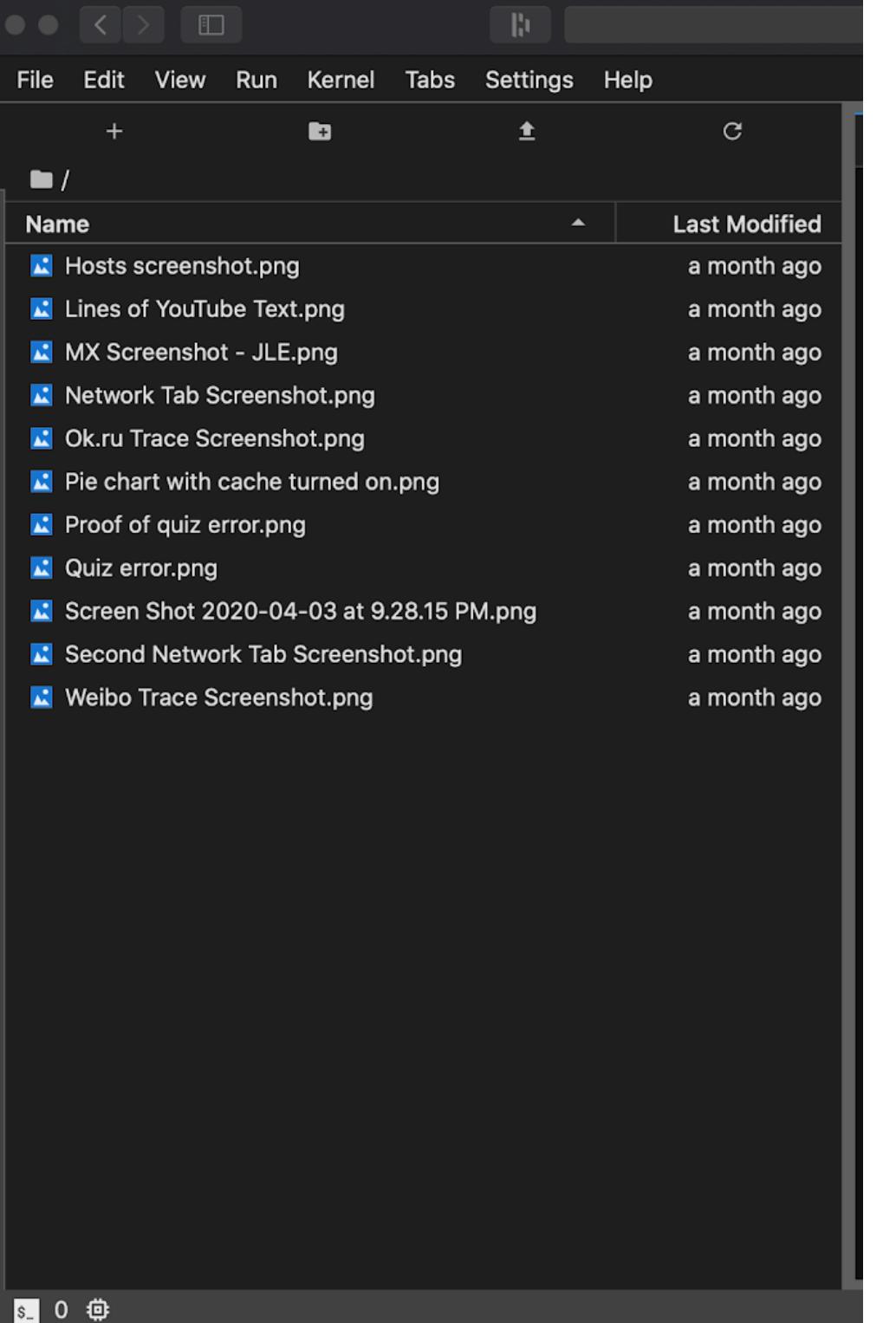
Sourcing - Segmentation JupyterLab



```
Week 1 — bash — 80x24
(base) Justins-MacBook-Pro:~ justin$ cd documents
(base) Justins-MacBook-Pro:documents justin$ cd UCI\ Schoolwork
(base) Justins-MacBook-Pro:UCI Schoolwork justin$ cd Informatics\ 285
(base) Justins-MacBook-Pro:Informatics 285 justin$ cd Week\ 1
(base) Justins-MacBook-Pro:Week 1 justin$ jupyter lab
```



```
Documents — bash — 80x24
(base) Justins-MacBook-Pro:~ justin$ cd documents
(base) Justins-MacBook-Pro:documents justin$ jupyter lab
```



Inflexible segmentation driven by JupyterLab launch location leads to an inconsistent and challenging user experience.

Sourcing - Content Preview

Company & Rank

Tableau

Google Drive

Pinterest

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Direct

Indirect

Influencer

Client

Feature Approach

Enables users to preview datasets prior to launching a new workbook.

Enables users to preview content in a file via "Details" panel.

Enables users to preview pinned items in their mood boards with the use a few selected images.

Users must open files to view any sort of content within.

Tableau

Connected data sources always displayed.

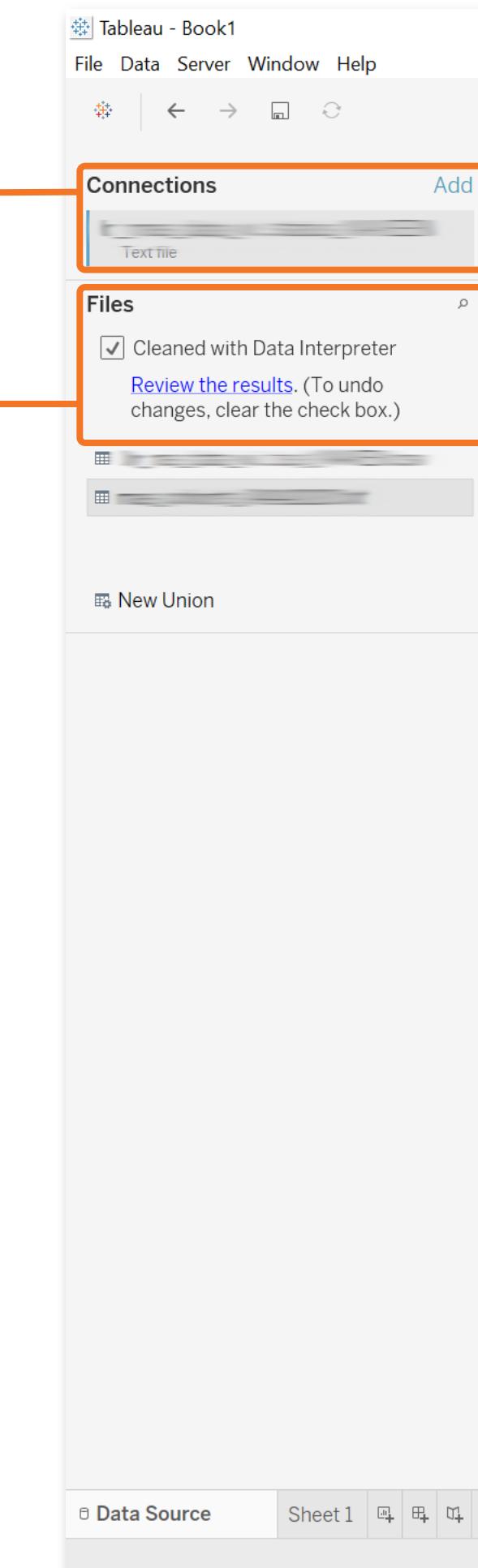
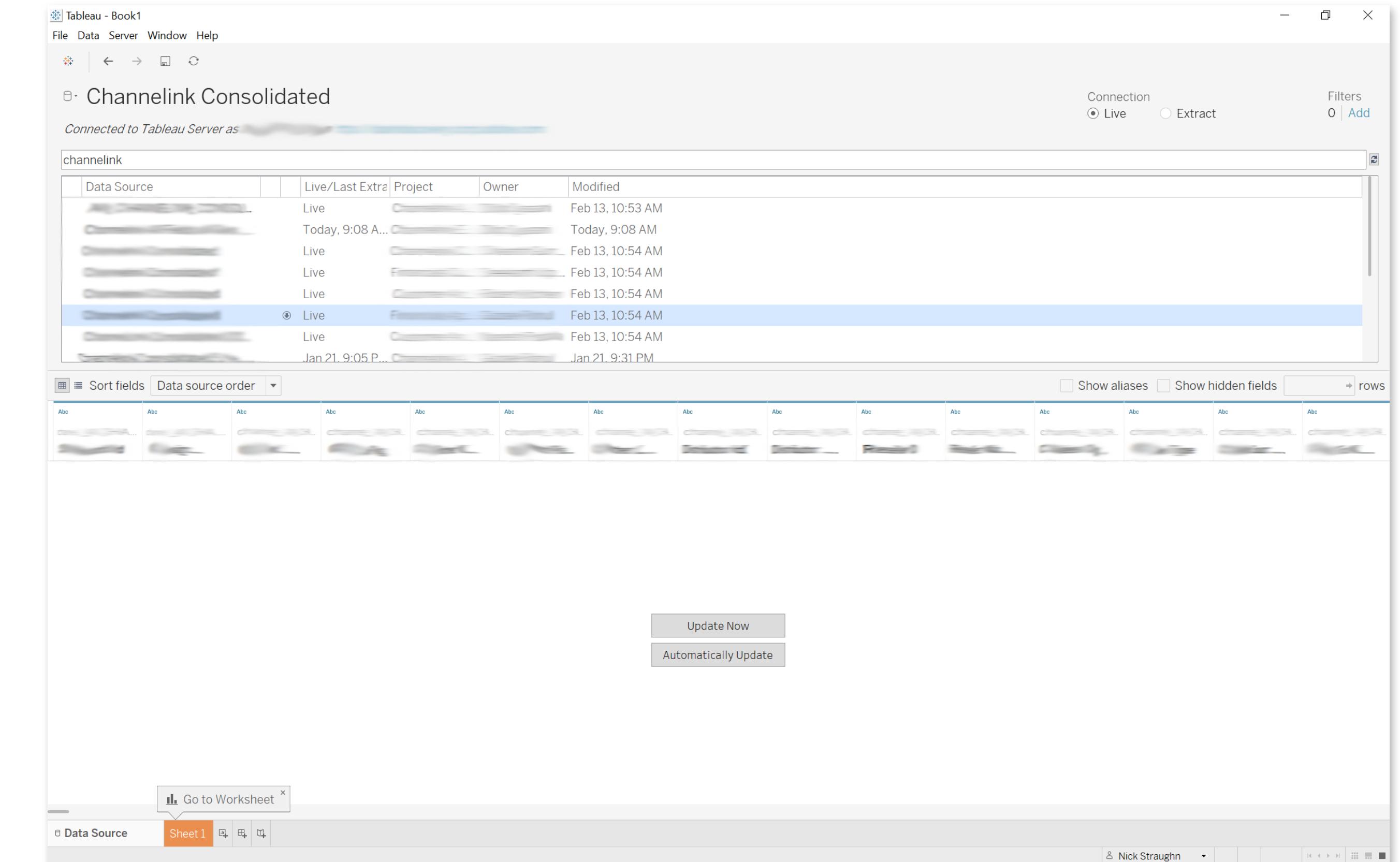


Tableau provides an option to clean the dataset with a Data Interpreter.

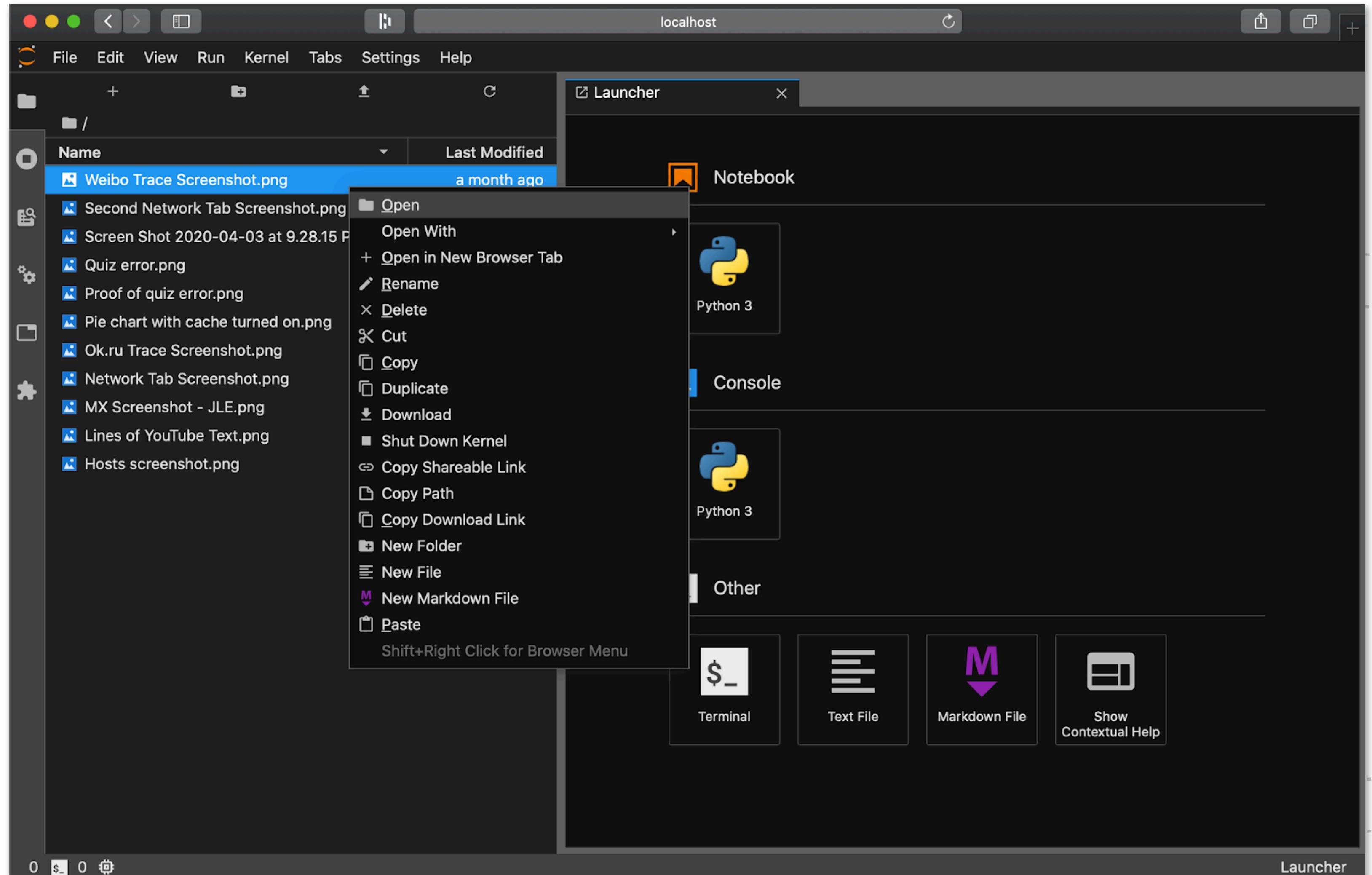
After cleaning, users are prompted to review the results

If the user does not require the data interpreter, or is connecting to a remote server, data previews will still be available in the main workspace UI



JupyterLab

No preview is available; user must open the file to see what's in it.



Customize

How users set up workspaces

Customization is the process by which a user sets up their data workspace. The customization process is driven by two key features that differentiate the competitors: **viewing options and relationship visualization**.

Our findings show that JupyterLab excels at data manipulation & visualization, but struggles when visually representing relationships between the data source (files) and data analysis (workspace).

Viewing Options

**Relationship
Visualization**



Customize - View Options

Company & Rank

Mac Finder

Google Drive

Tableau

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Indirect

Indirect

Direct

Client

Feature Approach

Enables users to select one of four pre-configured file views.

Enables users to select one of two pre-configured file views.

Enables users to design their own workspace set up via drag-and-drop.

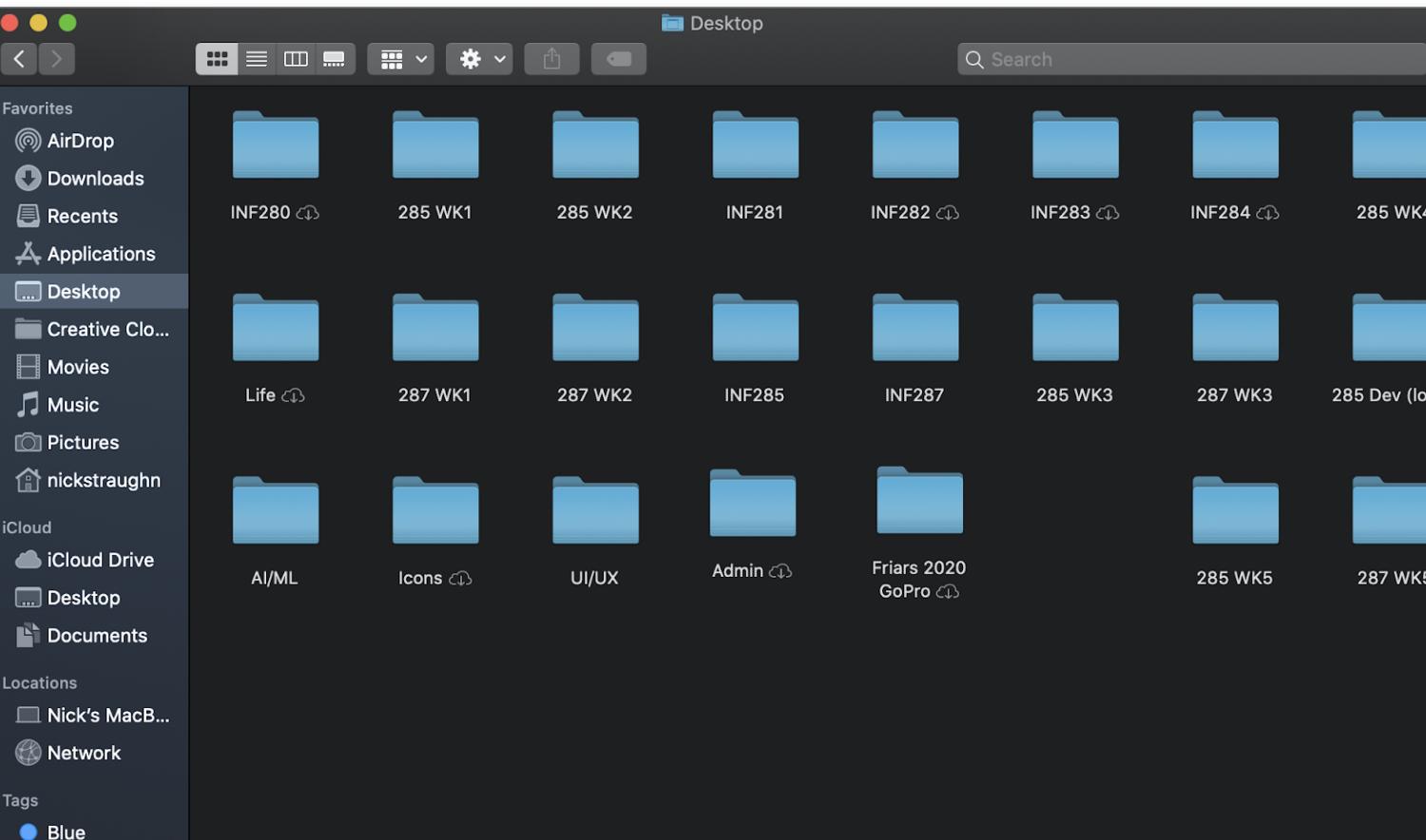
Enables users to design their own workspace, but view options are limited to "list view."

BEST IN CLASS

Customize - View Options

Mac Finder

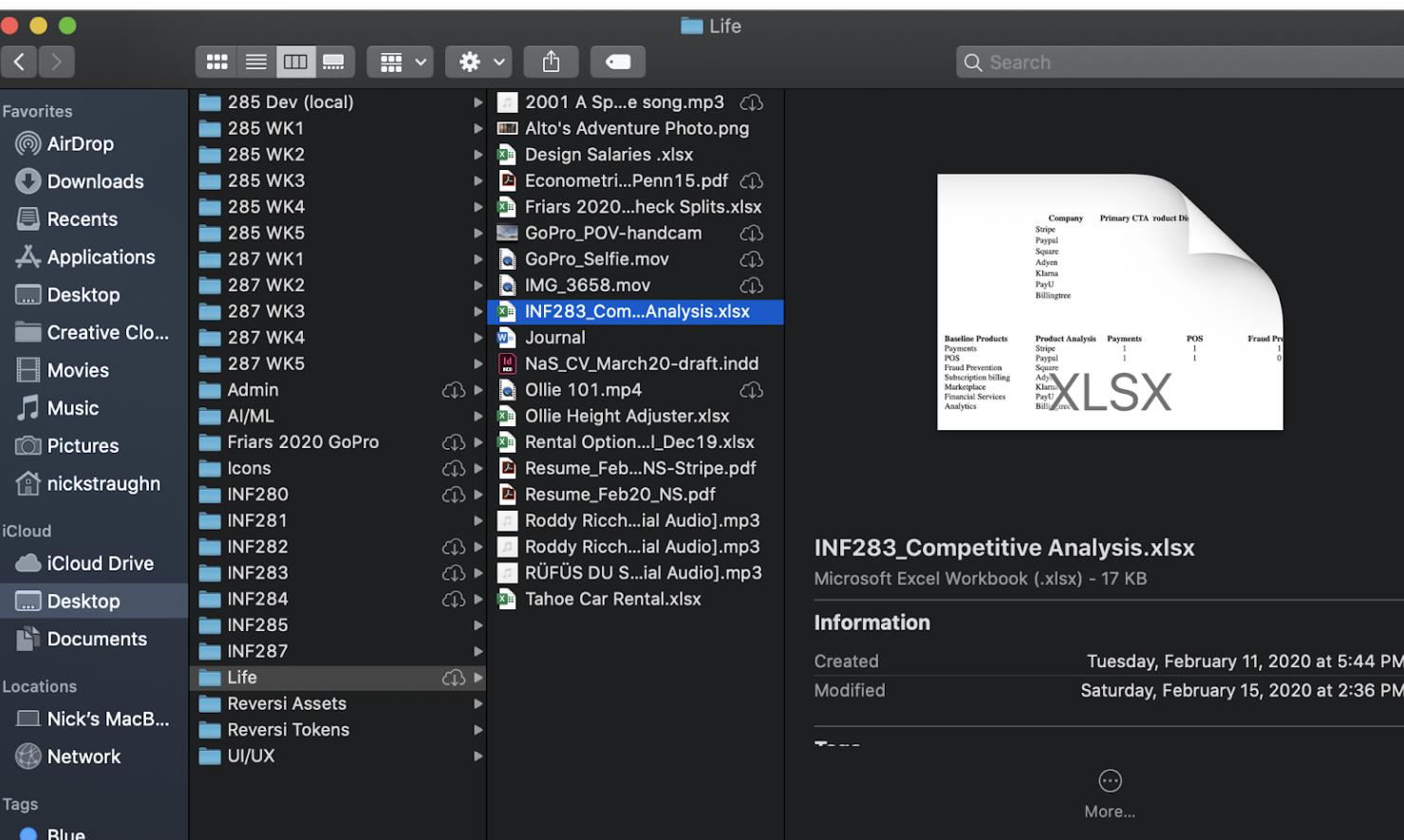
Option 1: Gallery View



Option 2: List View + Tree

Name	Date Modified	Size	Kind
285 Dev (local)	May 1, 2020 at 11:46 AM	--	Folder
285 WK1	Apr 5, 2020 at 12:37 PM	--	Folder
285 WK2	Apr 11, 2020 at 1:14 PM	--	Folder
285 WK3	Apr 18, 2020 at 12:50 PM	--	Folder
285 WK4	May 1, 2020 at 11:44 AM	--	Folder
285 WK5	May 1, 2020 at 12:30 PM	--	Folder
287 WK1	Apr 5, 2020 at 4:31 PM	--	Folder
287 WK2	Apr 6, 2020 at 6:16 PM	--	Folder
287 WK3	Apr 19, 2020 at 1:21 PM	--	Folder
287 WK4	Apr 24, 2020 at 5:34 PM	--	Folder
287 WK5	Apr 30, 2020 at 6:49 PM	--	Folder
Admin	Apr 23, 2020 at 8:24 PM	--	Folder
AI/ML	Apr 8, 2020 at 8:09 PM	--	Folder
Friars 2020 GoPro	Feb 8, 2020 at 11:57 AM	--	Folder
Icons	Apr 12, 2020 at 8:47 PM	--	Folder
INF280	Dec 5, 2019 at 5:15 PM	--	Folder
INF281	Dec 8, 2019 at 1:05 PM	--	Folder
INF282	Jan 23, 2020 at 5:45 PM	--	Folder
INF283	Apr 8, 2020 at 8:13 PM	--	Folder
INF284	Mar 27, 2020 at 11:56 AM	--	Folder
INF285	Mar 27, 2020 at 11:57 AM	--	Folder
INF287	Apr 6, 2020 at 3:44 PM	--	Folder
Life	Apr 17, 2020 at 5:51 PM	--	Folder
Reversi.Assets	May 2, 2020 at 3:15 PM	--	Folder
Reversi.Tokens	May 2, 2020 at 3:14 PM	--	Folder
UI/UX	Apr 26, 2020 at 11:49 AM	--	Folder

Option 3: List View + Path

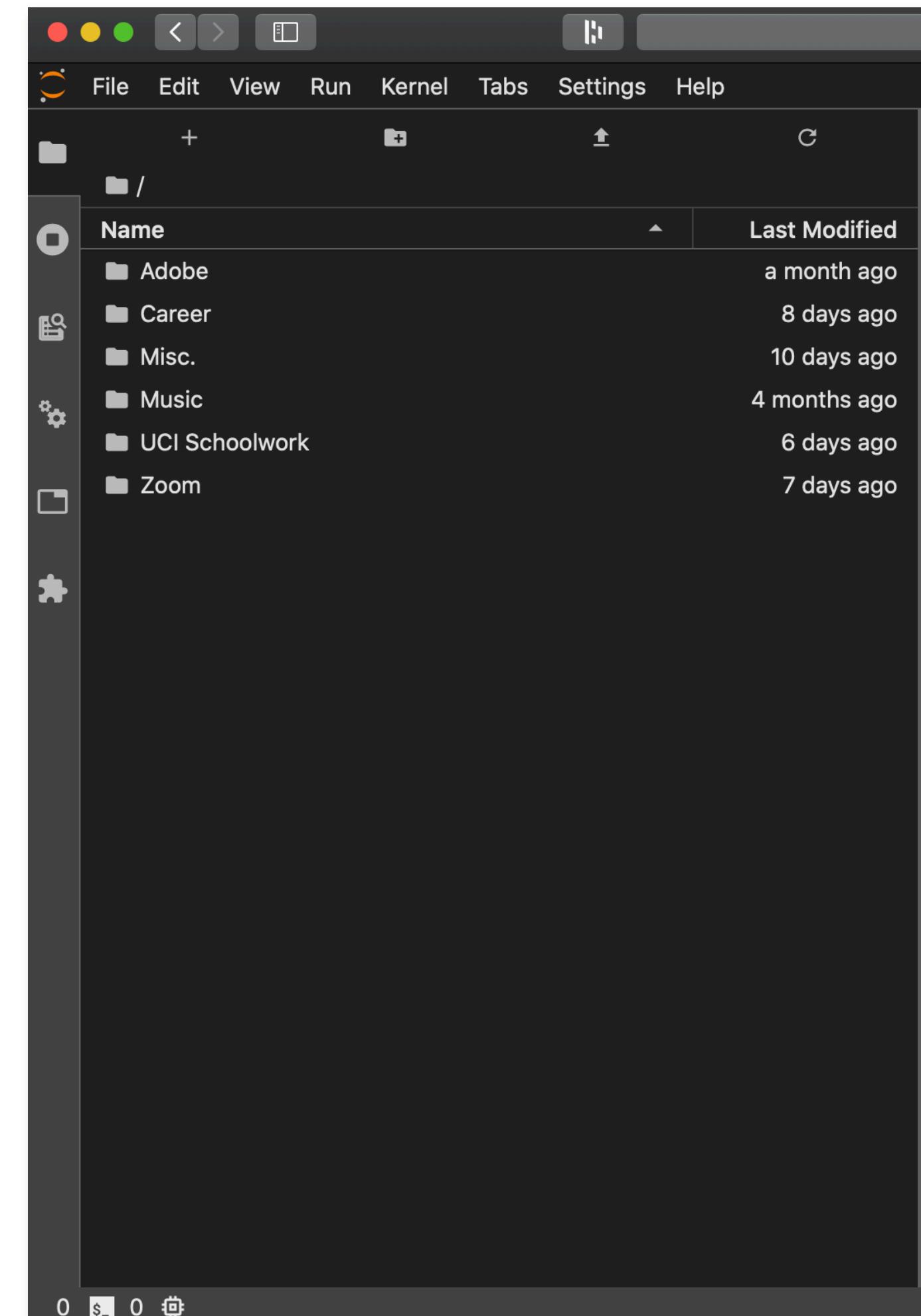


Option 4: Content Preview

A screenshot of the Mac Finder application window in List View, specifically showing a content preview for an Excel file named "INF283_Competitive Analysis.xlsx". The preview pane on the right side displays a table comparing PayPal and Stripe, listing their pros and cons. The table has columns for Primary CTA, Product Discoverability, Pros, and Cons. The Pros and Cons sections are color-coded in green and red respectively. The sidebar on the left shows the user's desktop, recent documents, and various system locations.

JupyterLab

User can adjust amount of screen real estate devoted to list, but has no ready options beyond list view.



Customize - Relationship Visualization

Company & Rank

Spotify

Pinterest

Lightroom CC

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Influencer

Influencer

Influencer

Client

Feature Approach

Currently-playing songs and podcasts are highlighted in the UI with their respective album covers. Playlists and genres are represented with images and are visible when selected. Enables users to upload images of their choosing to playlist they created, creating a tight mental bond for the user.

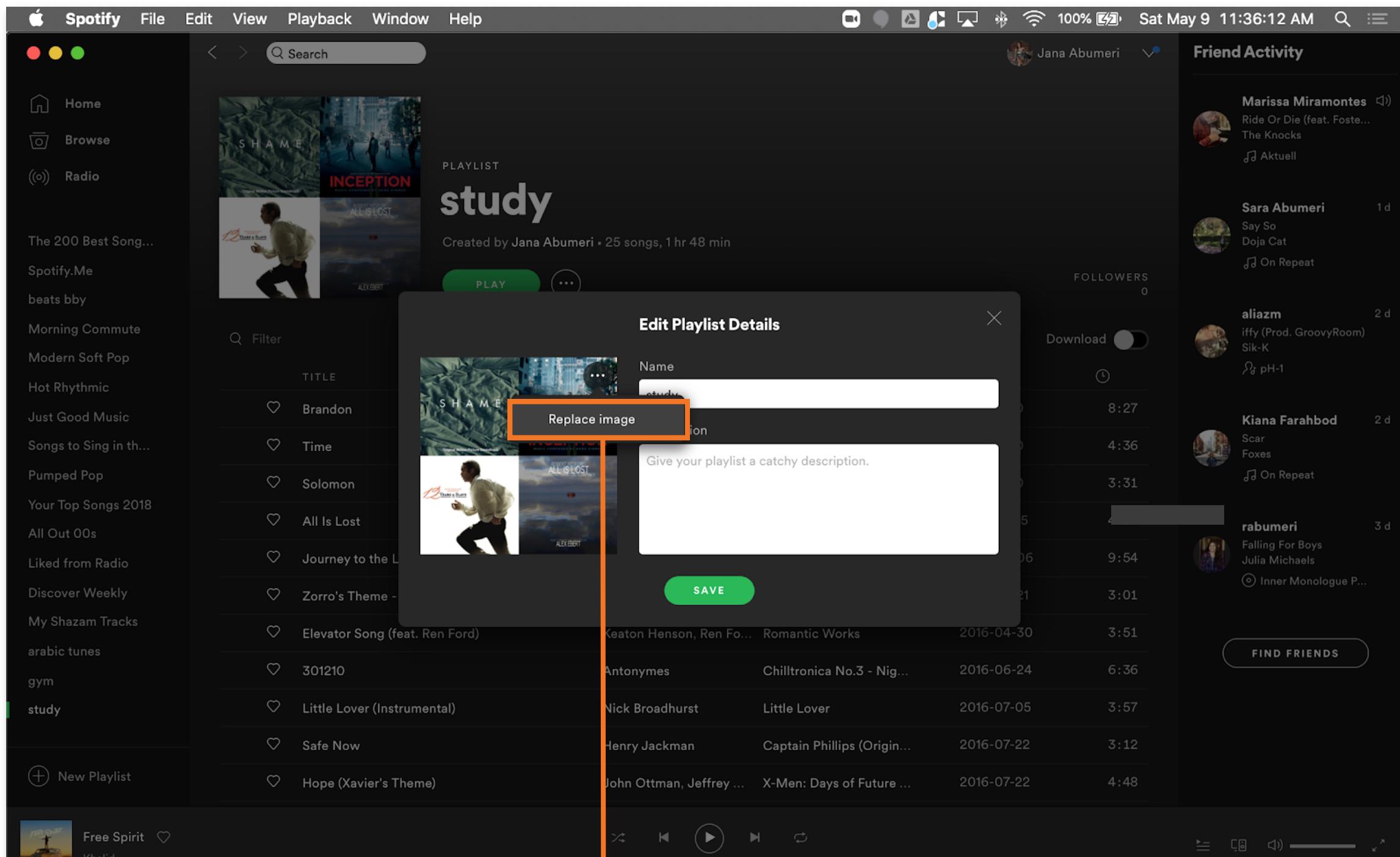
Mood boards are filled with images that represent the user's end goal in their organizational and planning needs.

Active files (photos) and folders (albums) are always highlighted in the UI.

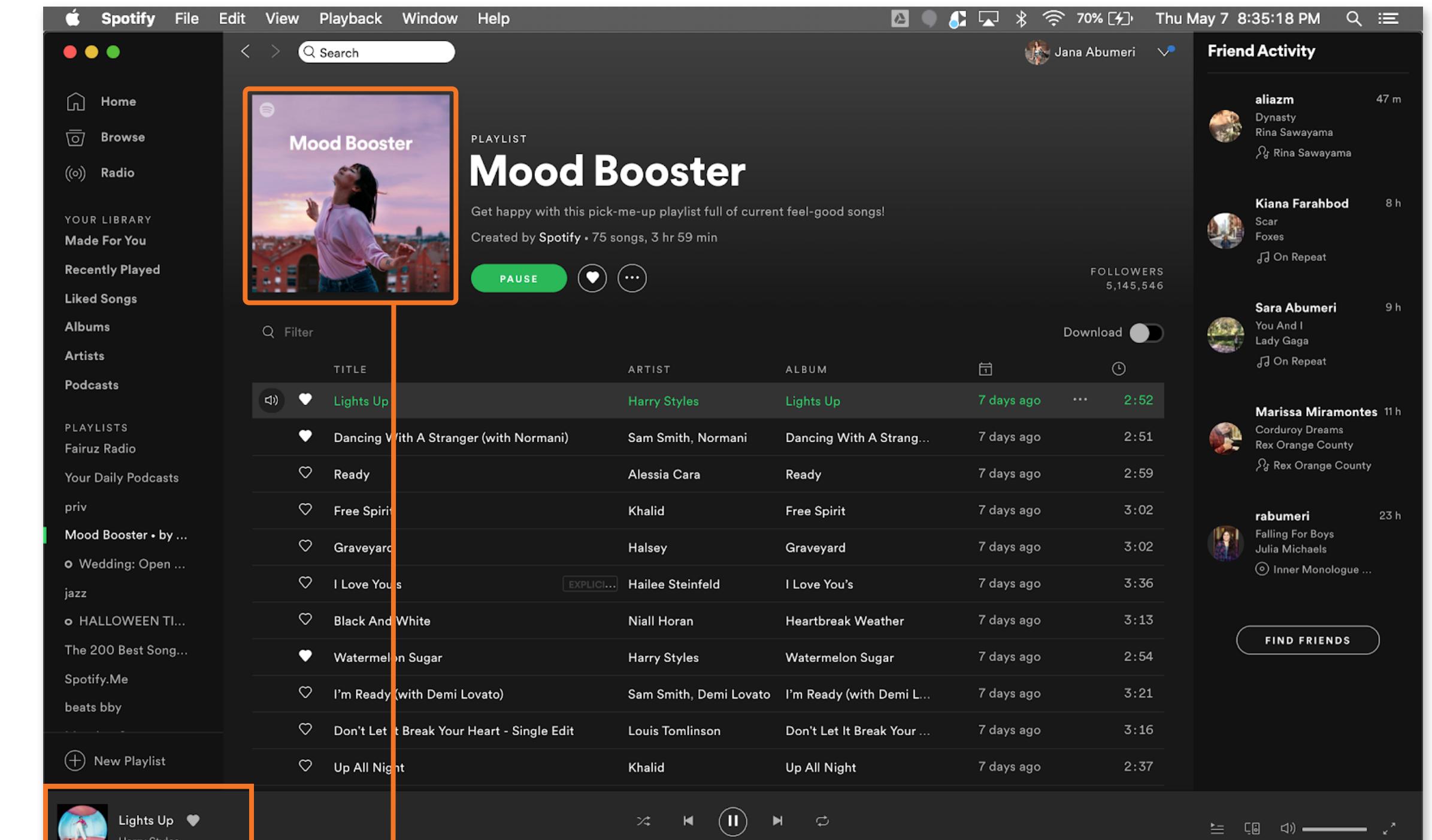
Supports relationship visualization via active file toggle. However, this feature is hard to discover and works inconsistently.

BEST IN CLASS

Customize - Relationship Visualization
Spotify



Users can upload images of their choice for playlists they've created.

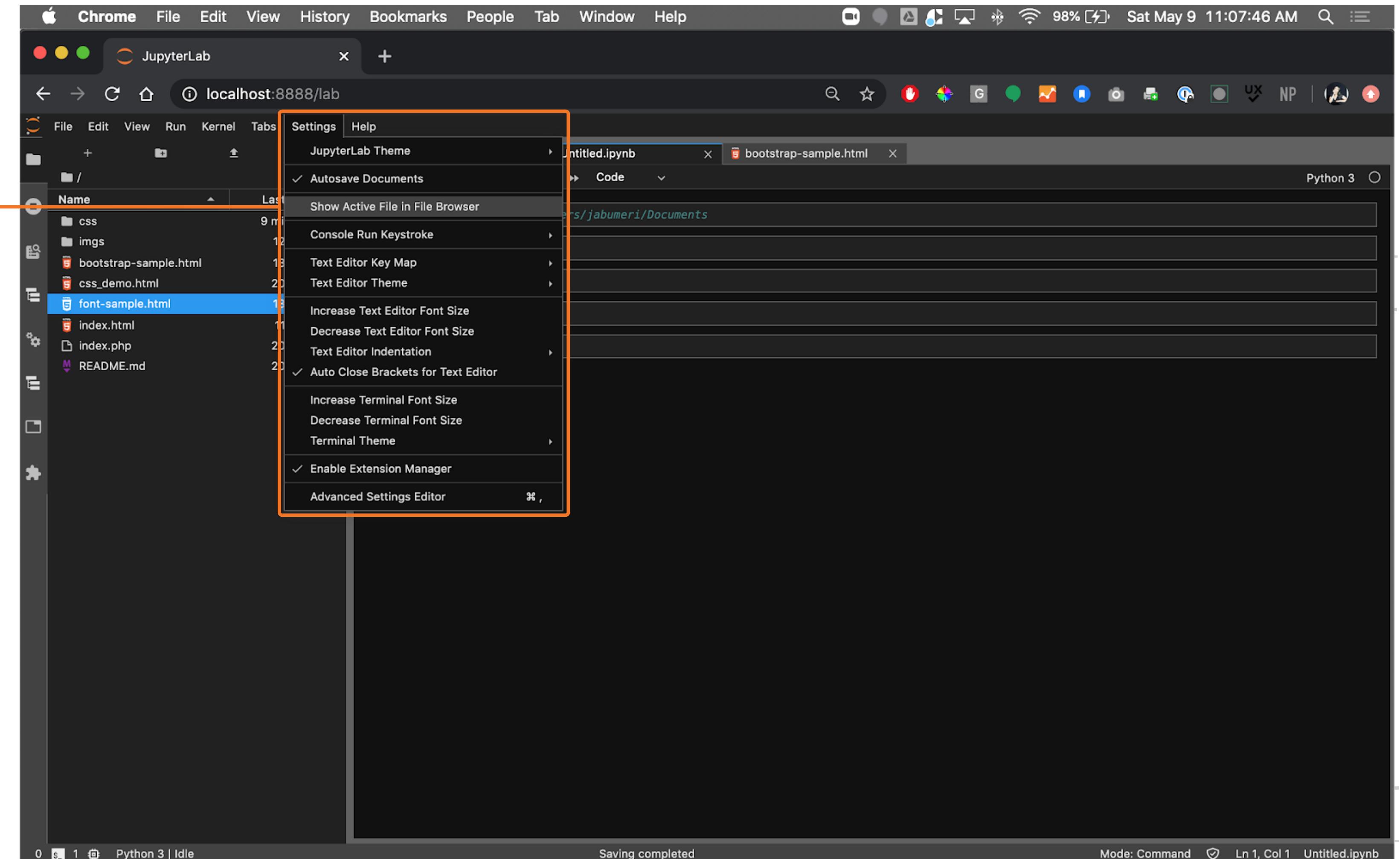


Album cover for the song that is currently playing is always visible in the bottom left corner.

Image covers selected by Spotify are visible when playing a predefined playlist (by Spotify).

JupyterLab

Show Active File can be toggled on & off.
The desired behavior is unclear as it functions inconsistently.



Navigate

How users orient themselves

Navigation is the process by which users orient themselves in their file structure. The navigation process is driven by three key features that differentiate the competitors: **location awareness, wayfinding, and concurrent browsing.**

Our findings show that JupyterLab stumbles compared to the location awareness and wayfinding features of Google Drive. Further, JupyterLab lacks the true concurrent browsing capabilities of Mac Finder.

Location Awareness

Wayfinding

Concurrent Browsing



Navigate - Location Awareness

Company & Rank

Google Drive

Pinterest

Mathematica

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Indirect

Influencer

Direct

Client

Feature Approach

Breadcrumb with root is always visible to the user and enables users to expand the view to see the full path.

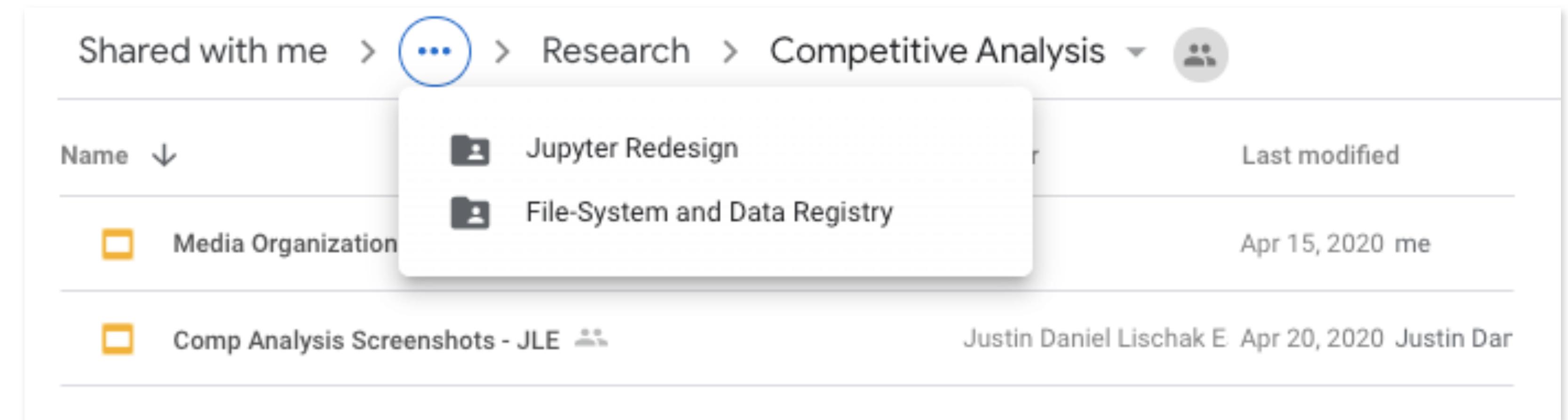
Mood boards can be nested but the root level board is always visible to users.

Dropdown allows user to view where they are, preceding folders, and the root folder.

Root folder is location from which JupyterLab was launched, which may not be the “true” root of the file system.

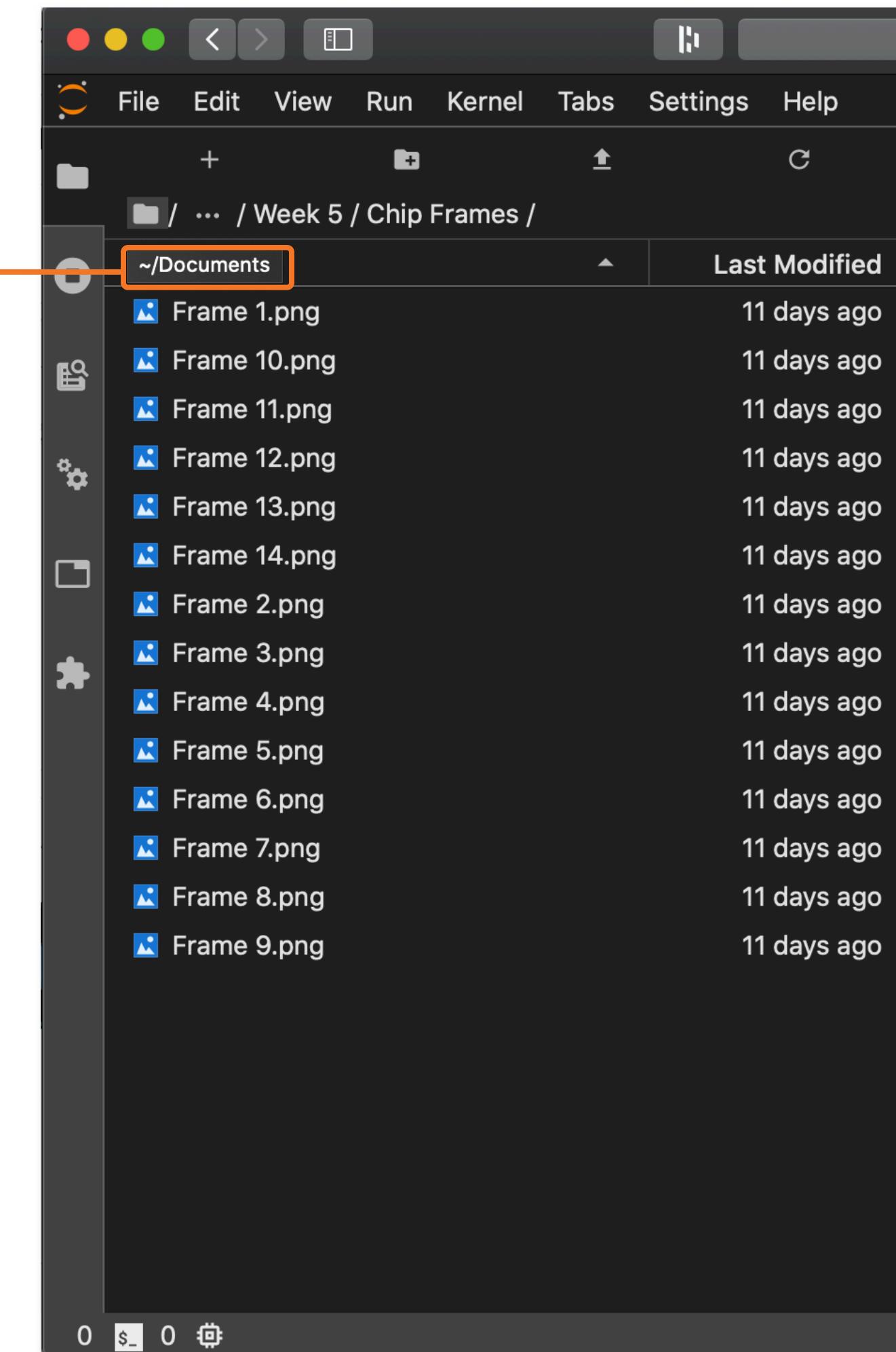
Google Drive

Root directory and bottom two directories are always visible; user can expand the full path using the ellipsis.



JupyterLab

Hover-over shows what appears to be root folder, but in reality is only the folder from which JupyterLab is running – which may not be the true top level directory of the system.



Navigate - Wayfinding

Company & Rank

Google Drive

Notion

Google Chrome

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Indirect

Influencer

Indirect

Client

Feature Approach

Enables users to create shortcuts of content that has been shared with them and point those shortcuts to the user's personal drive for easier navigation.

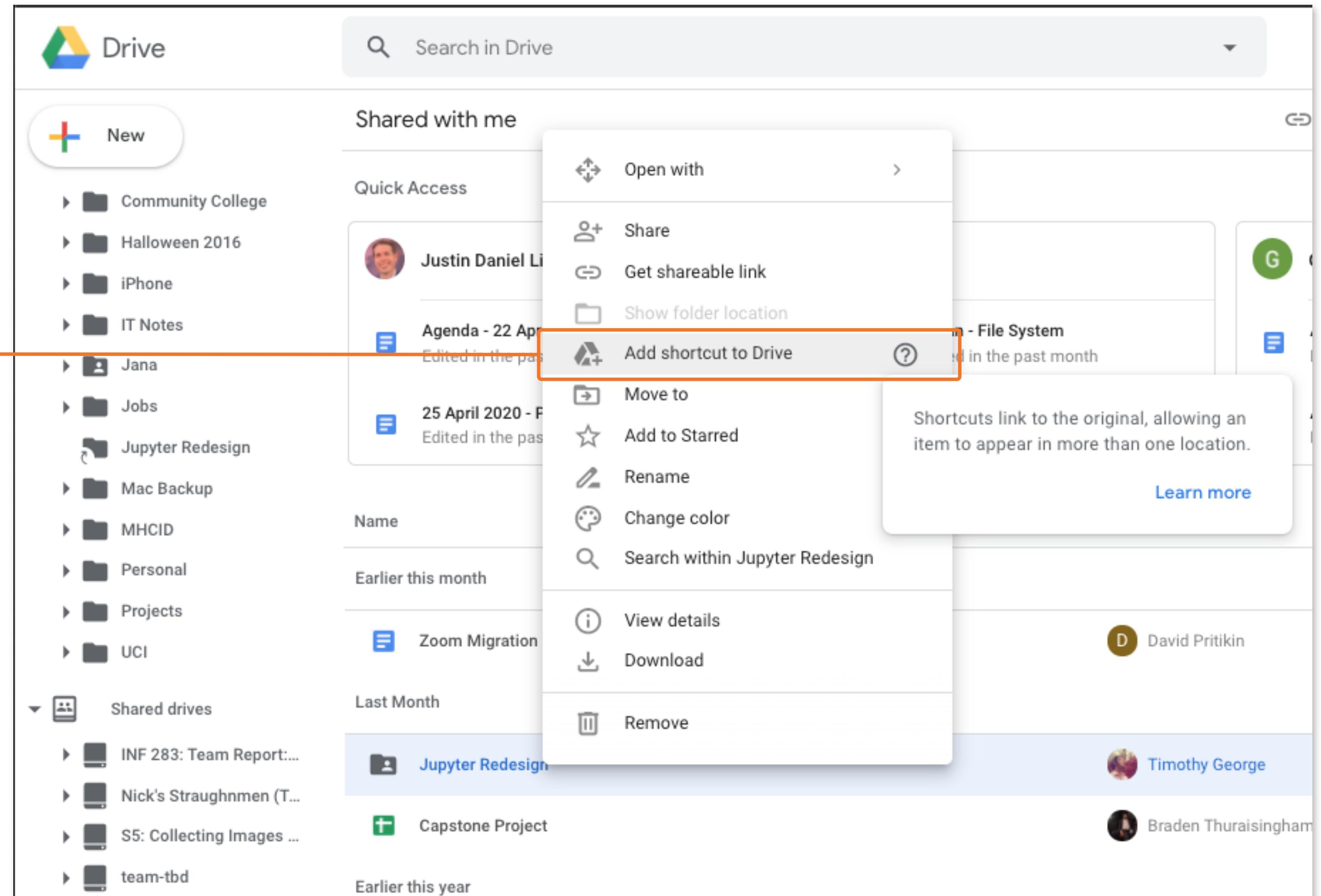
Enables users to embed "breadcrumbs" at any time in their notebooks to show the current page location.

Enables users to bookmark web pages.

Copy file path command truncates the file path, ending at the location from which JupyterLab is running.

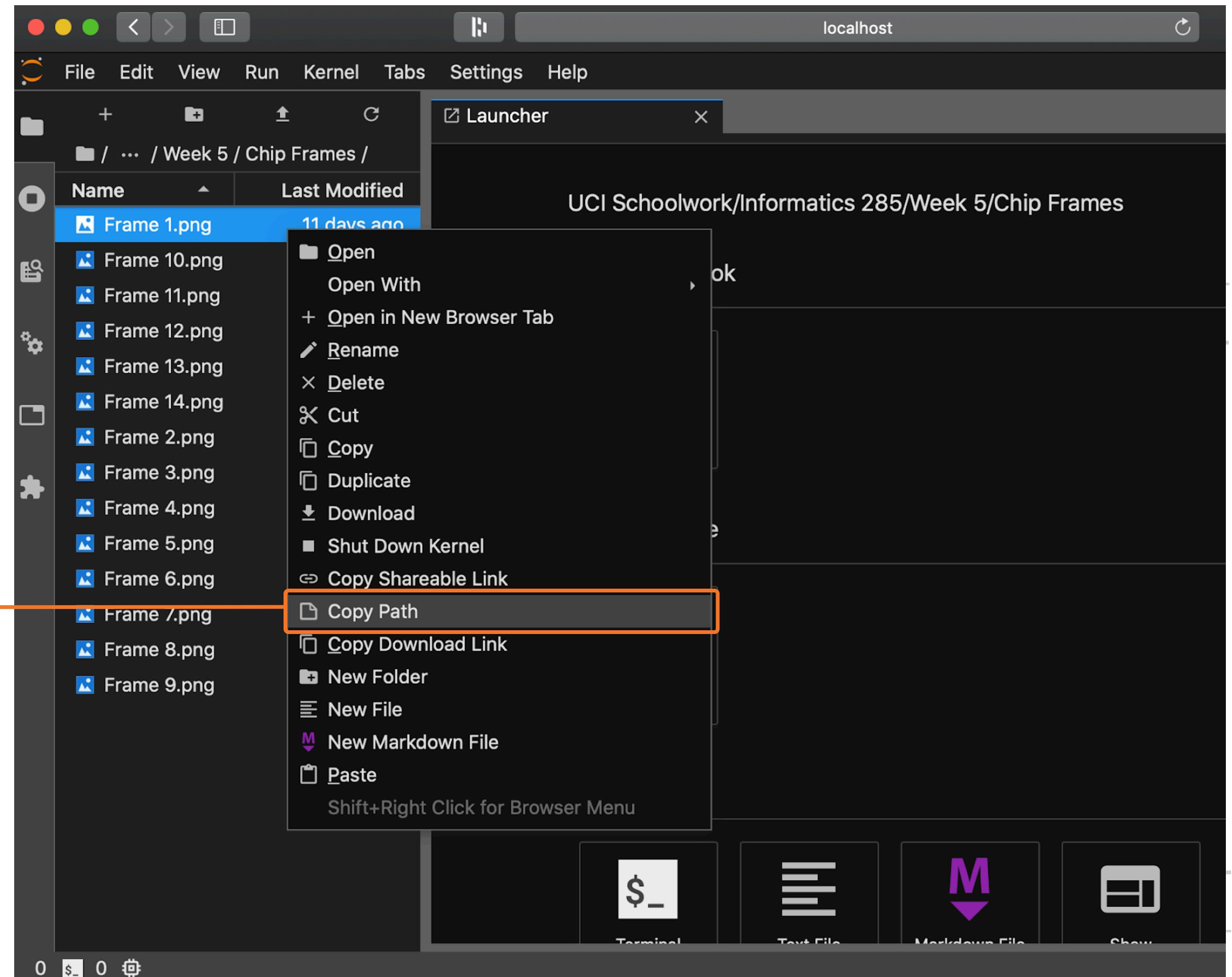
Google Drive

By right clicking on "Shared Drives", users can create shortcuts of content that has been shared with them ("Shared with me") and "point" them to their personal drive ("My Drive").



JupyterLab

Copying path creates a misleading user experience because the copied path ends at the location where JupyterLab is running – which may not be the entire path to the file in the underlying system.



Navigate - Concurrent Browsing

Company & Rank

Mac Finder

Google Chrome

Tableau

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Indirect

Indirect

Direct

Client

Feature Approach

Enables users to open multiple directories in different browsers.

Enables users to open multiple tabs and windows for browsing.

Enables users to search for new data sources while connected and working within another database.

Enables user to adjust workspace to view multiple files within the directory structure from which JupyterLab is running, but not to perform true concurrent browsing of different directories.

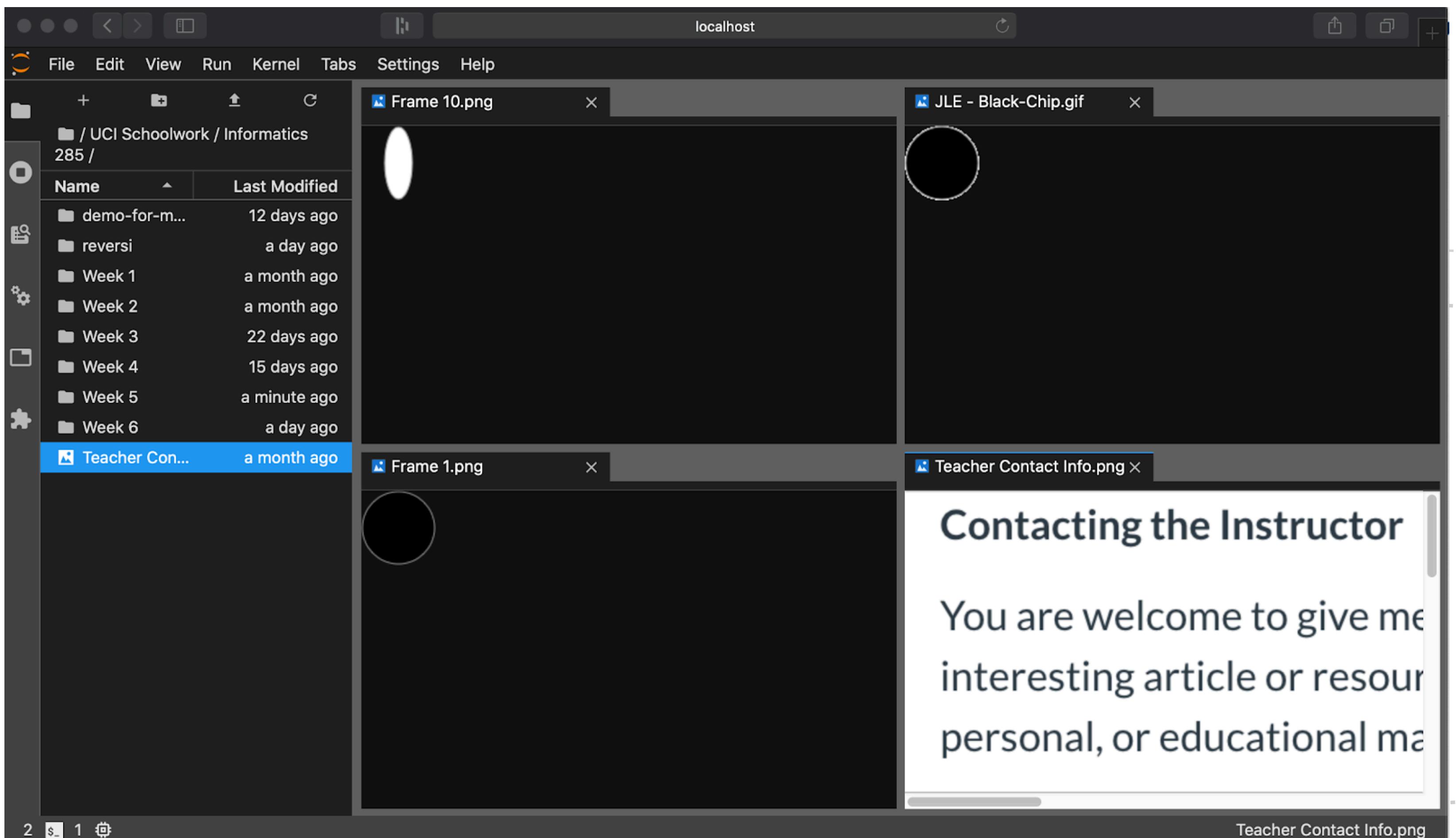
Navigate - Concurrent Browsing

Mac Finder



Users can open a new file browser window by accessing the File menu or using the command+N shortcut. User can explore all directories available without constraint.

JupyterLab



Manage

How users maintain their work

Management is the process by which users maintain their files. The management process is driven by three key features that differentiate the competitors: **organizational freedom, revision history, and sharing permissions.**

Our findings show that JupyterLab offers limited management capabilities versus its competitors. Pinterest's organizational freedom eclipses JupyterLab's more constrained structure; Mathematica offers superior revision history features; and Google Drive's sharing features are easier to find and more flexible to deploy.

**Organizational
Freedom**

Revision History

Sharing Permissions



Manage - Organizational Freedom

Company & Rank

Pinterest

Google Drive

Spotify

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Influencer

Indirect

Influencer

Client

Feature Approach

Enables users to create mood boards with nested sections, in any order they see fit. They can append notes to boards, merge boards, edit, reorder and drag & drop pins.

Enables users to create and manage their file system (add, copy, delete) as they see fit. Enables users to drag & drop files.

Enables users to add and delete files to their personal library. Enables users to create, edit, and reorder playlists.

JupyterLab inherits its organizational freedom level from the file system and operating system from which it is launched.

Pinterest

A screenshot of a Pinterest board titled "Spring 2019 Mood Board". The board has 52 pins and 38 followers. At the top left, there's a "Add dates" button highlighted with an orange box. Below the board title, there are three navigation buttons: "Your Pins" (highlighted with an orange box), "Shop", and "More ideas". The main area displays four pins: a woman with long blonde hair, a woman sitting on a ledge, a woman in a pink dress, and a woman in a white top.

Users can add, edit, move, copy, and delete pins.

A screenshot of the same Pinterest board after some pins have been selected. A modal window titled "Select all" is open, showing "0 Pins selected". Below it are four buttons: "Move", "Copy", "Delete", and a red "Done" button. The rest of the board interface is visible in the background.

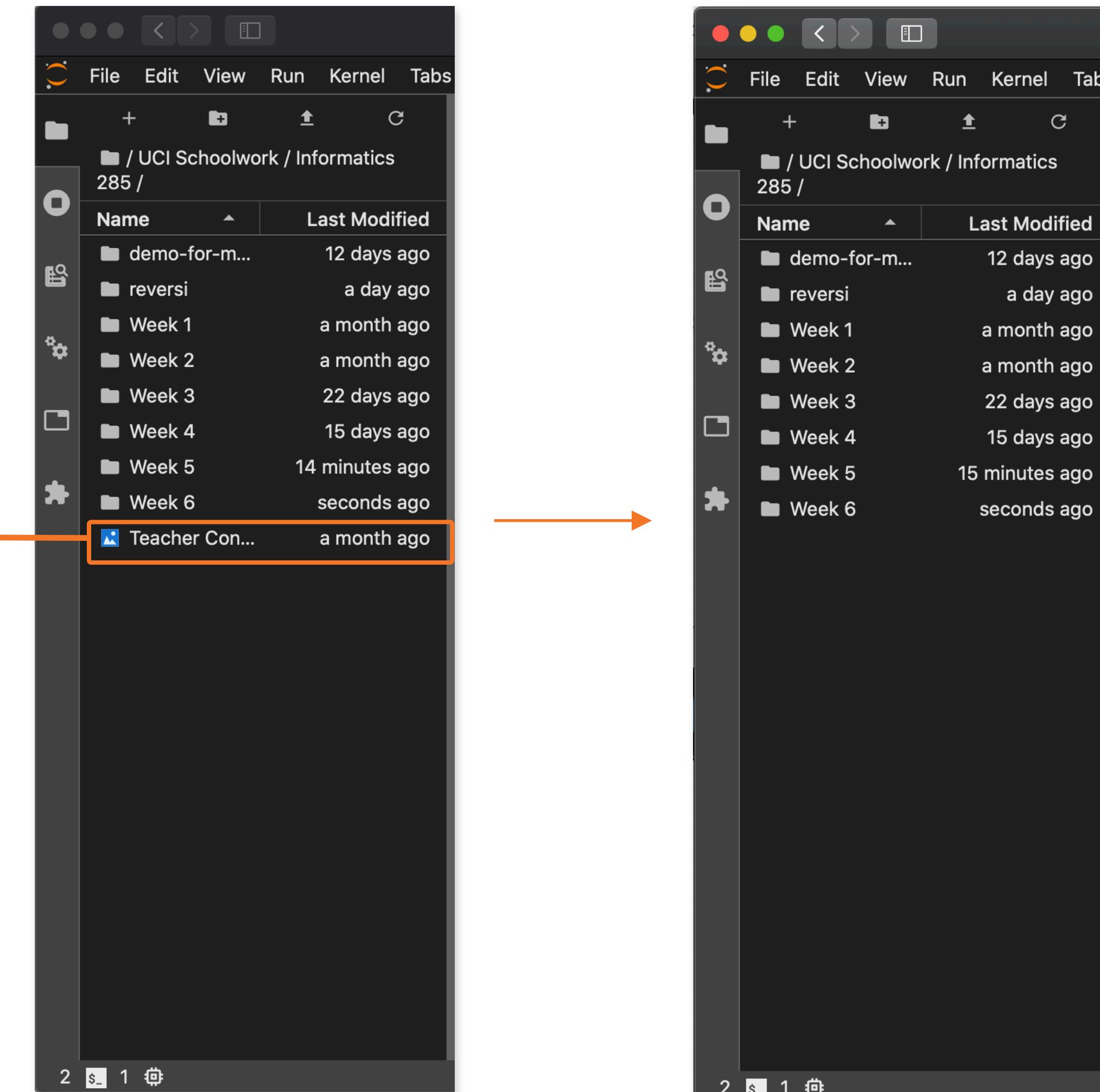
Users can edit their existing board and reorganize it to their liking. When editing they can add descriptions, rename the board, categorize it, and so forth.

A screenshot of the "Edit your board" dialog for the "Spring 2019 Mood Board". The dialog includes fields for "Name" (Spring 2019 Mood Board), "Description" (What's your board about?), "Category" (What kind of board is it?), and an "Add dates" section with a placeholder "Select start and end". Other settings include "Visibility" (Keep this board secret) and "Personalization" (Show Pins inspired by this board in your home feed). The right side of the screen shows the board's pins and a sidebar with "Your Pins" and "Organize" buttons.

Users can add start and end dates as reminders

JupyterLab

Moving or deleting a file in JupyterLab moves it in the underlying file system, but only within the prime directory from which JupyterLab is running.



Manage - Revision History

Company & Rank

Mathematica

Google Drive

Lightroom CC

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Direct

Indirect

Influencer

Client

Feature Approach

Supports non-destructive edits and revert to original or backup.

Extensive revision history available to the user (hour based). Supports non-destructive edits and reverts.

Supports non-destructive edits and revert to original.

Revert and reload commands exist, but are challenging to locate and effectuate.

Manage - Revision History

Mathematica

https://www.wolframcloud.com/env/74fd9e83-282e-4de9-8093-a3d7397e9bf7#href

Users can restore files to backups or the latest working version from the beginning of their session.

Would you like to replace the current state of this notebook with the backup version from the beginning of this session?

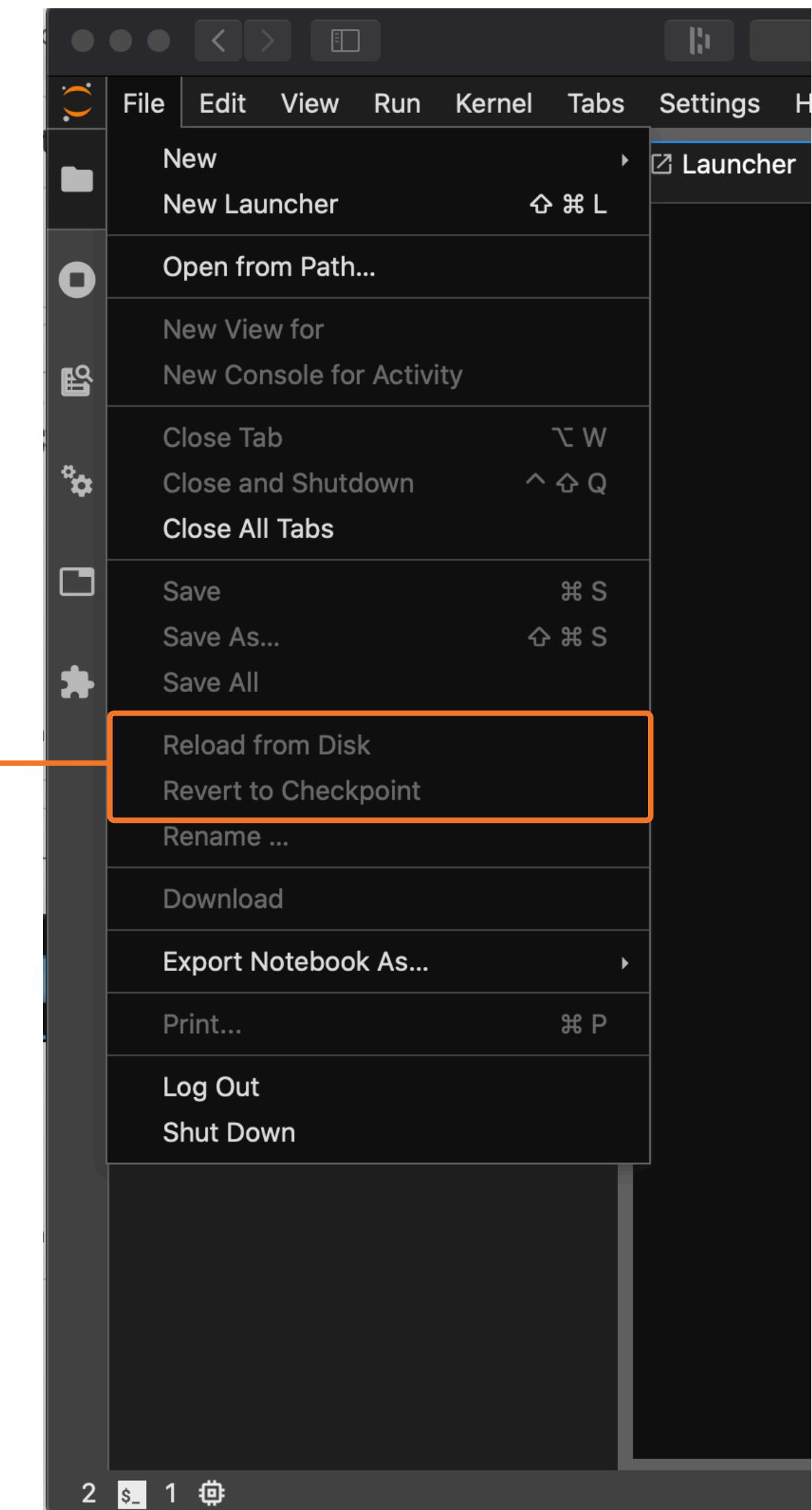
Revert to state from: Sat Apr 25 2020 17:35:43 GMT-0700 (Pacific Daylight Time)

This action cannot be undone.

Cancel Revert

JupyterLab

“Reload from Disk” and “Revert to Checkpoint” commands are difficult to find and difficult to properly utilize.



Manage - Sharing Permissions

Company & Rank

Google Drive

Pinterest

Notion

JupyterLab

Type of Competitor

(*direct, indirect, influencer*)

Indirect

Indirect

Influencer

Client

Feature Approach

Collaboration is a core functionality. Enables users to share workspaces, drives, folders/files, with whomever they wish.

Enables users to share pins and collaborate on mood boards.

Enables users to share entire notebook workspaces or individual documents (with specific people or public facing).

Ability to share files and notebooks is challenging to find and deploy.

Manage - Sharing Permissions

Google Drive

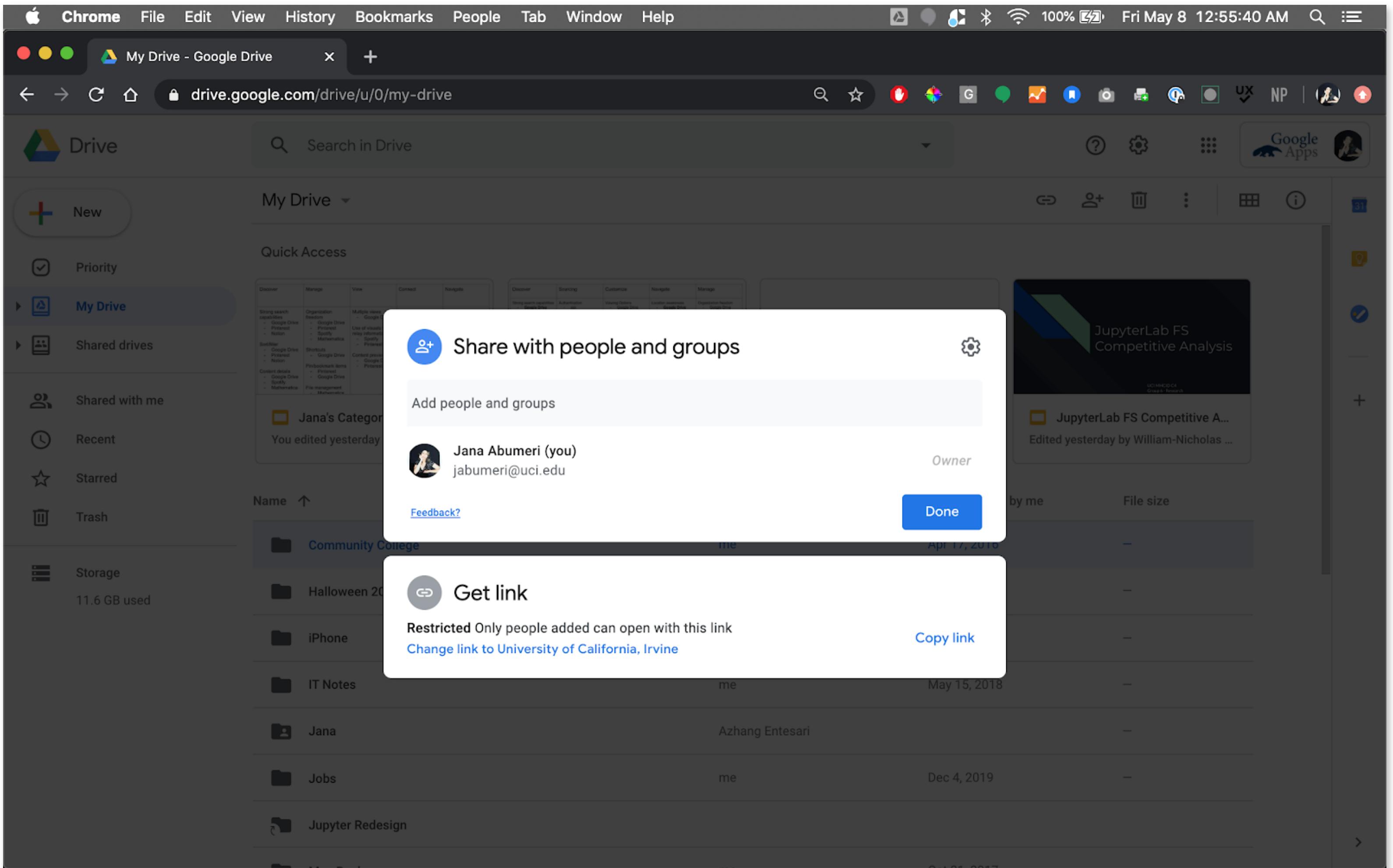
Share button provides easy user access and function visibility.

Users have multiple options for sharing:

- Drives
- Workspaces
- Individual folders/files

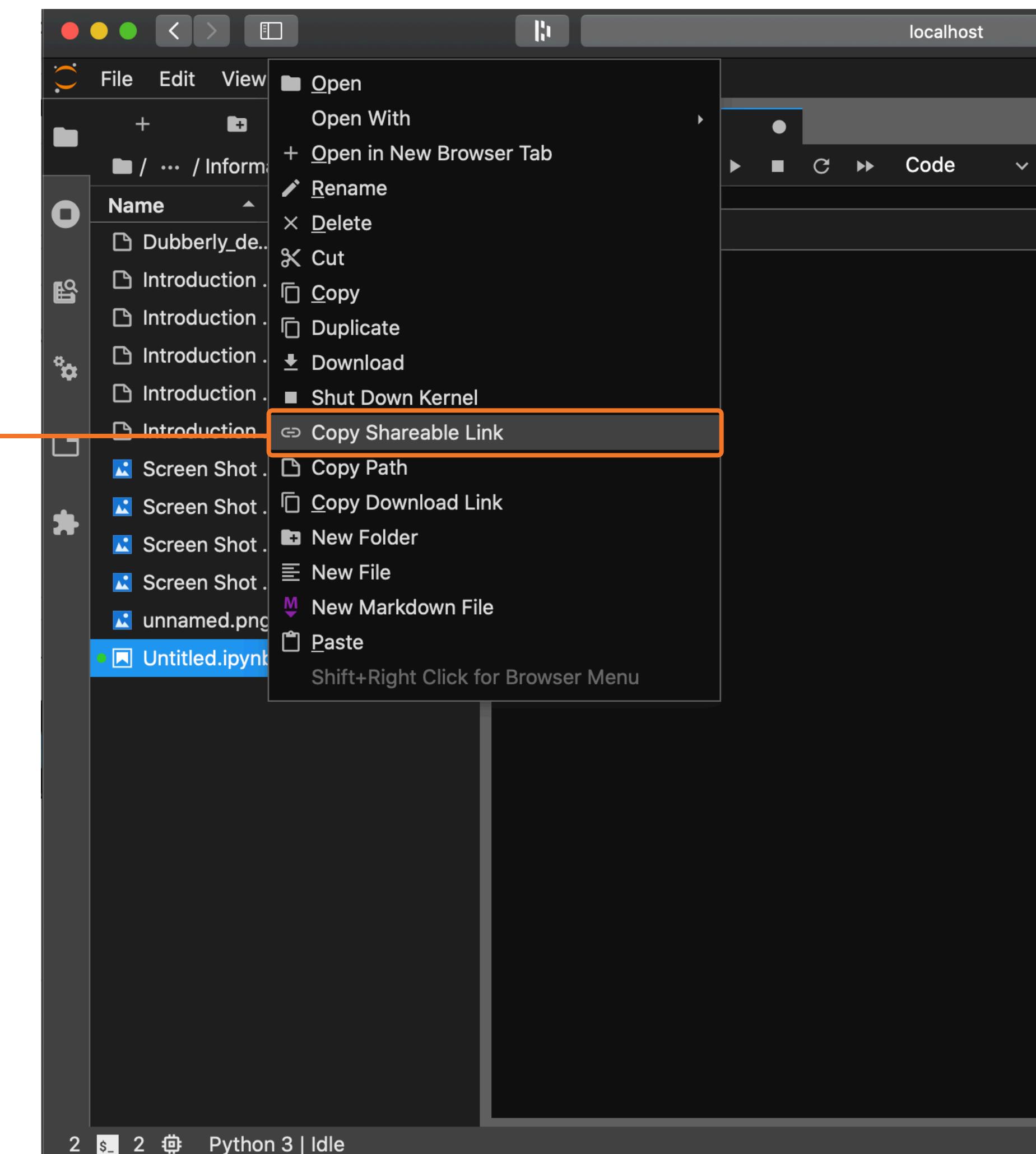
Can share with:

- Individuals
- Organizations
- Public



JupyterLab

Sharing functionality is hard to find and offers limited options.



Conclusion

JupyterLab's technical limitations constrain users to those subdirectories underneath the current working directory from which JupyterLab is running. While we understand that this technical limitation is a security feature and may not be easily overcome, it butts heads with the typical user's mental model of how a file system should work. At minimum, **users need in-system visibility into this technical limitation** to better understand how to leverage JupyterLab.

Beyond this core challenge lie numerous opportunities for JupyterLab to improve its file system features. New or upgraded features such as **search, sort / filter, and view options** are particularly low-hanging fruit. Other more cutting-edge but resource-heavy opportunities also await, particularly in the **relationship visualization and sharing permissions spaces**.

As we continue to support JupyterLab's development of its new file system, we will collaborate with JupyterLab leadership and community to rank and prioritize the feature opportunities identified in this competitive analysis.



Thank you!
