



JUPYTERLAB EXTENSIONS



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What is JupyterLab

What are JupyterLab Extensions

Why use JupyterLab Extensions

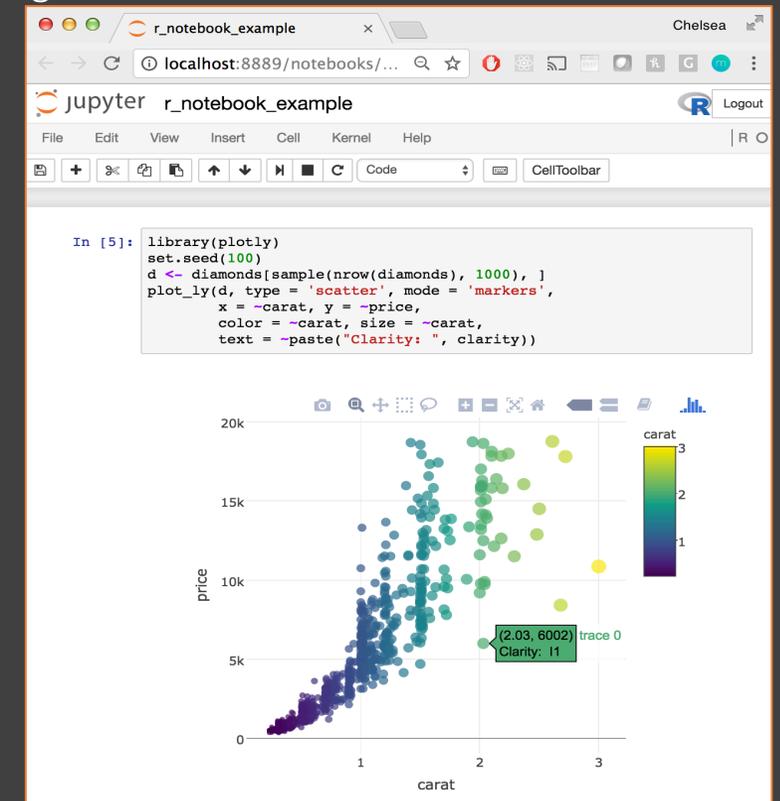
Installing Extensions

Creating an Extension



What is JupyterLab?

- Started from classic Jupyter Notebook, a web-based interface that can execute code, edit in-place, contain text, images, etc.
- Notebooks presents a document-like view rendered by modern browsers
- Kernels interpret/execute cell contents with support for over 50 programming languages
- Classic Notebook:



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What is JupyterLab?

- JupyterLab is the next generation UI for Project Jupyter
- It provides a modular and extensible architecture
- It will eventually replace the classic Jupyter Notebook UI
- JupyterLab:

A screenshot of the JupyterLab web interface. The interface is divided into several panes. On the left is a 'File Explorer' pane showing a file tree with folders like 'Untitled Folder' and files like 'hi.ipynb', 'ml-linearreg.ipynb', and 'pandas_sample.ipynb'. The top pane is a 'Console/Terminal' showing a terminal window with a sample markdown file. The right pane is a 'Tabbed Workspaces' area containing a notebook titled 'ml-linearreg.ipynb'. The notebook is in 'Code' mode and displays a scatter plot titled 'Predicted Profit vs. Population Size'. The plot shows blue dots representing 'Training Data' and a red line representing 'Prediction'. Below the plot is a text block and a code cell. A 'Split screen' callout points to the notebook pane. Other callouts point to the 'File Explorer', 'Console/Terminal', and 'Tabbed Workspaces' panes.

File Explorer

Console/Terminal

Tabbed Workspaces

Split screen

```
1 # Sample
2
3 This is a Markdown sample file.
4
```

ml-linearreg.ipynb

Code Python 3

Predicted Profit vs. Population Size

Profit

Population

— Prediction

••• Training Data

Looks pretty good! Since the gradient decent function also outputs a vector with the cost at each training iteration, we can plot that as well. Notice that the cost always decreases - this is an example of a convex optimization problem.

```
[19]: fig, ax = plt.subplots(figsize=(12,8))
```

Python 3 | Idle Mode: Command Ln 1, Col 1 ml-linearreg.ipynb

What is JupyterLab?

- On [JupyterLab Org Github](https://github.com/jupyterlab) :

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The screenshot shows the GitHub profile for JupyterLab. The profile header includes the JupyterLab logo, the name "JupyterLab", and the description "JupyterLab: The Next Generation UI for Project Jupyter". Below the header, there are statistics for Repositories (43), Packages, People (72), and Projects. The "Pinned repositories" section is highlighted with an orange border. Two callout boxes with arrows point to the "jupyterlab" repository (labeled "JupyterLab and core extensions") and the "lumino" repository (labeled "JupyterLab extension repos").

Repository Name	Description	Language	Stars	Forks
jupyterlab	JupyterLab computational environment.	JavaScript	9.7k	1.6k
jupyter-renderers	Renderers and renderer extensions for JupyterLab	Jupyter Notebook	347	51
lumino	Lumino is a library for building interactive web applications	TypeScript	101	26
team-compass	A repository for team interaction, syncing, and handling meeting notes across the JupyterLab ecosystem.		15	5
extension-cookiecutter-ts	A cookiecutter recipe for JupyterLab extensions in Typescript	Python	67	27
extension-examples	JupyterLab Extensions by Examples	TypeScript	60	13

At the bottom of the page, there is a search bar "Find a repository...", filter buttons for "Type: All" and "Language: All", and a "Top languages" section showing TypeScript, Python, Jupyter Notebook, JavaScript, and CSS.

What is JupyterLab?

- On [JupyterLab Github](#) :

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Backend code:

- Handlers
- Commands
- Debug
- Extension setup
- etc

A screenshot of the JupyterLab GitHub repository page. The page shows the repository name "jupyterlab / jupyterlab" at the top, along with statistics for "Used by" (16.8k), "Watch" (338), "Unstar" (9.7k), and "Fork" (1.6k). Below this, there are tabs for "Code", "Issues" (1,335), "Pull requests" (68), "Actions", "Projects" (2), "Wiki", "Security" (0), and "Insights". The main content area displays the repository description: "JupyterLab computational environment. <https://jupyterlab.readthedocs.io/>". Below the description, there are statistics for "18,671 commits", "22 branches", "0 packages", "10,532 releases", "293 contributors", and a "View license" link. A "Branch: master" dropdown and a "New pull request" button are visible. A "Merge pull request #8191 from blink1073/es-lint" is shown, with a "Latest commit f0153e0 6 days ago" status. A list of files and folders is displayed, including ".github", "binder", "buildutils", "design", "dev_mode", "docs", "examples", "jupyter-config/jupyter_notebook...", "jupyterlab", "packages", "release", and "scripts".

Core extensions:

- Application
- Utils
- Code editor
- Notebook
- etc

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What are JupyterLab Extensions

JupyterLab is designed to be extendable

Extensions enable users and developers to:

- Create new editors and output visualization
- Add buttons and menu items to existing functionality
- Provide APIs for other extensions to use

JupyterLab itself is just a collection of core extensions

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Why use JupyterLab Extensions

The core extensions are intentionally limited in scope

Every user needs slightly different tools for their own work

By installing extensions specific to their scenario they can create a customized environment tailored to their work

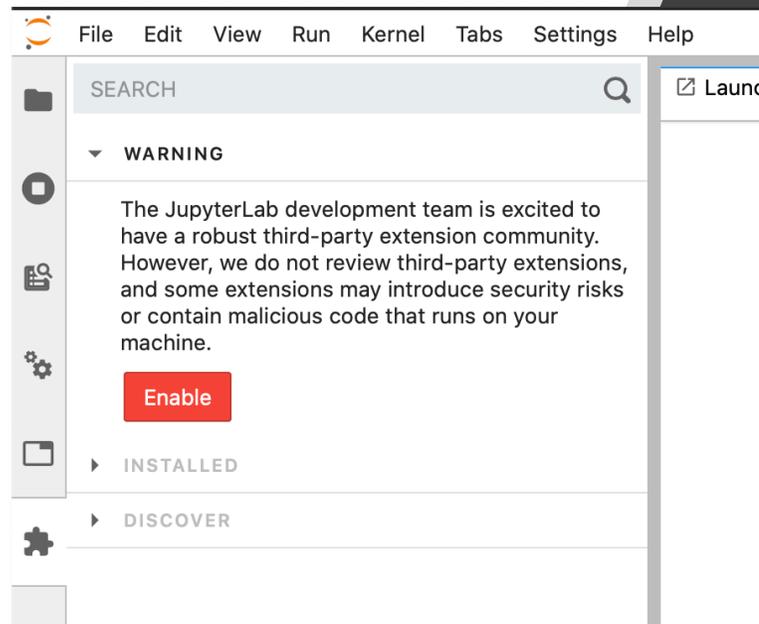
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Installing Extensions

1. Start JupyterLab

```
$ jupyter lab
```

2. To install an extension via the UI open the Extension Manager tab in the side bar

- The UI is still experimental and will show a warning prior to enablement

3. Once enabled it will list currently installed extensions in the Installed section and extensions available to install in the Discover tab.

- You can search both sections using the search bar
- The Discover tab displays packages published on npm with the keyword 'jupyterlab-extension'

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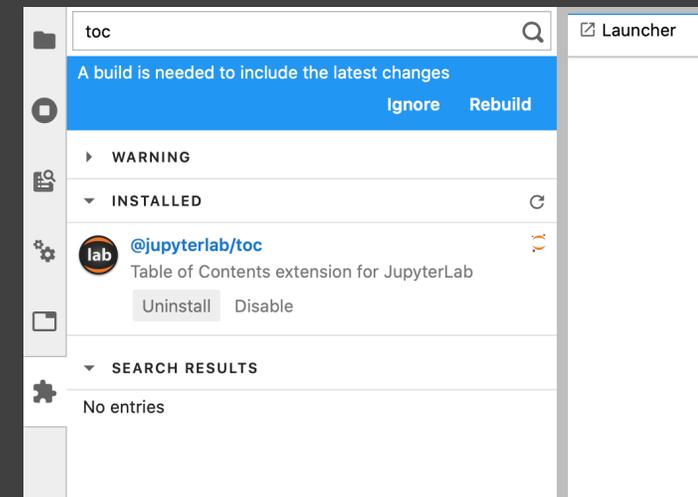
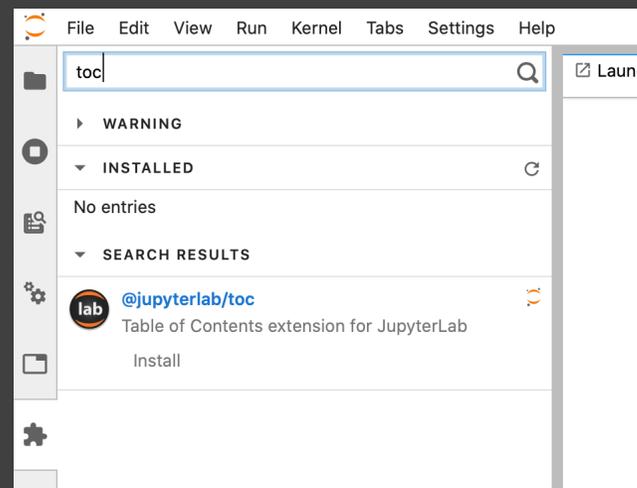
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Installing Extensions

4. In the search bar, search for "toc" and click Install
5. After installing it will prompt you to rebuild jupyterlab



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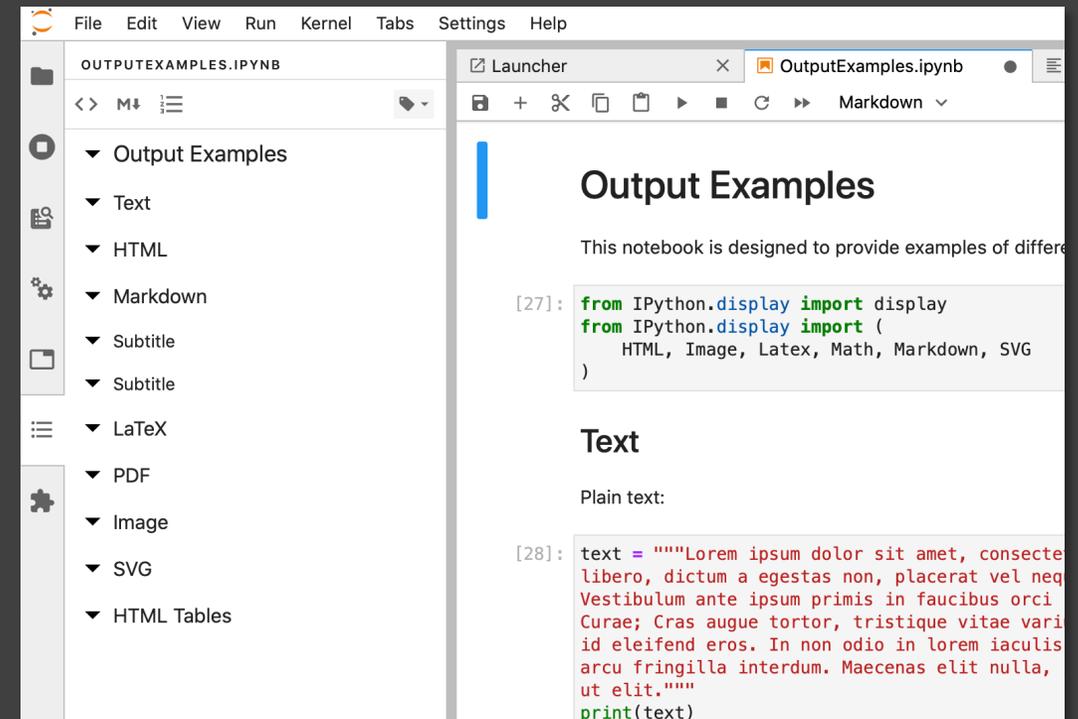
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6. Once it finishes installing it will prompt you to refresh
7. After refreshing you will see the new TOC tab in your sidebar, try opening the TOC tab while a notebook, markdown, or python file is open



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Installing Extensions

8. Some extensions can't be installed via the UI. Try searching for and installing "git". It will display a message telling you that the extension requires requires a corresponding server extension.

9. For server extensions we need to install via the CLI

1. Go back to your terminal and (double) ctrl-C lab

2. Then install the git extension:

```
$ pip install jupyterlab-git
```

```
$ jupyter lab build
```

3. This will install both the lab extension and the server extension. Once it's finished start JupyterLab again:

```
$ jupyter lab
```

Definitions:

labextension – front end extensions; can be installed and built via UI without restarting JupyterLab

serverextension – back end extensions; must be installed via CLI and require restarting JupyterLab

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Creating an Extension

1. Creating a new extension using the cookie-cutter

```
$ pip install cookiecutter
```

```
$ cookiecutter  
https://github.com/jupyterlab/extension-  
cookiecutter-ts
```

2. Customizing your extension (following the guide on the next slide)
3. Installing your extension (following the generated README)
4. Running JupyterLab with your extension

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A few quick steps to an example custom extension

- Add these dependencies to package.json

```
"@jupyterlab/apputils": "^2.0.0",  
"@jupyterlab/docregistry": "^2.0.0",  
"@jupyterlab/notebook": "^2.0.0",  
"@lumino/disposable": "^1.3.5"
```

- Copy button.ts in examples to src and import it in index.ts

```
import {ButtonExtension} from "./button";
```

- Add this code to the activate function in index.ts

```
let buttonExtension = new ButtonExtension();  
app.docRegistry.addWidgetExtension('Notebook',  
buttonExtension);
```

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Useful Links

JupyterLab Docs: <https://jupyterlab.readthedocs.io/>

Extension cookie-cutter: <https://github.com/jupyterlab/extension-cookiecutter-ts>

GitHub Topics filter for finding extensions:
<https://github.com/topics/jupyterlab-extension>