

The background is a gradient from dark purple at the top to dark blue at the bottom, speckled with white dots resembling a starry sky. On the left side, there are several concentric circular patterns. One large circle has a scale from 140 to 260 in increments of 10, with tick marks. Other smaller circles have partial scales or arrows. Some circles are solid, some are dashed, and some have arrows indicating a direction of rotation.

PYTHON FOR SPATIAL ANALYTICS

LUCAS ELBERT SURYANA

GEOLYTICS INSTITUTE

CONTENT

- *Introduction to Python in spatial analytics*
- *Use case: Riskesdas Data*

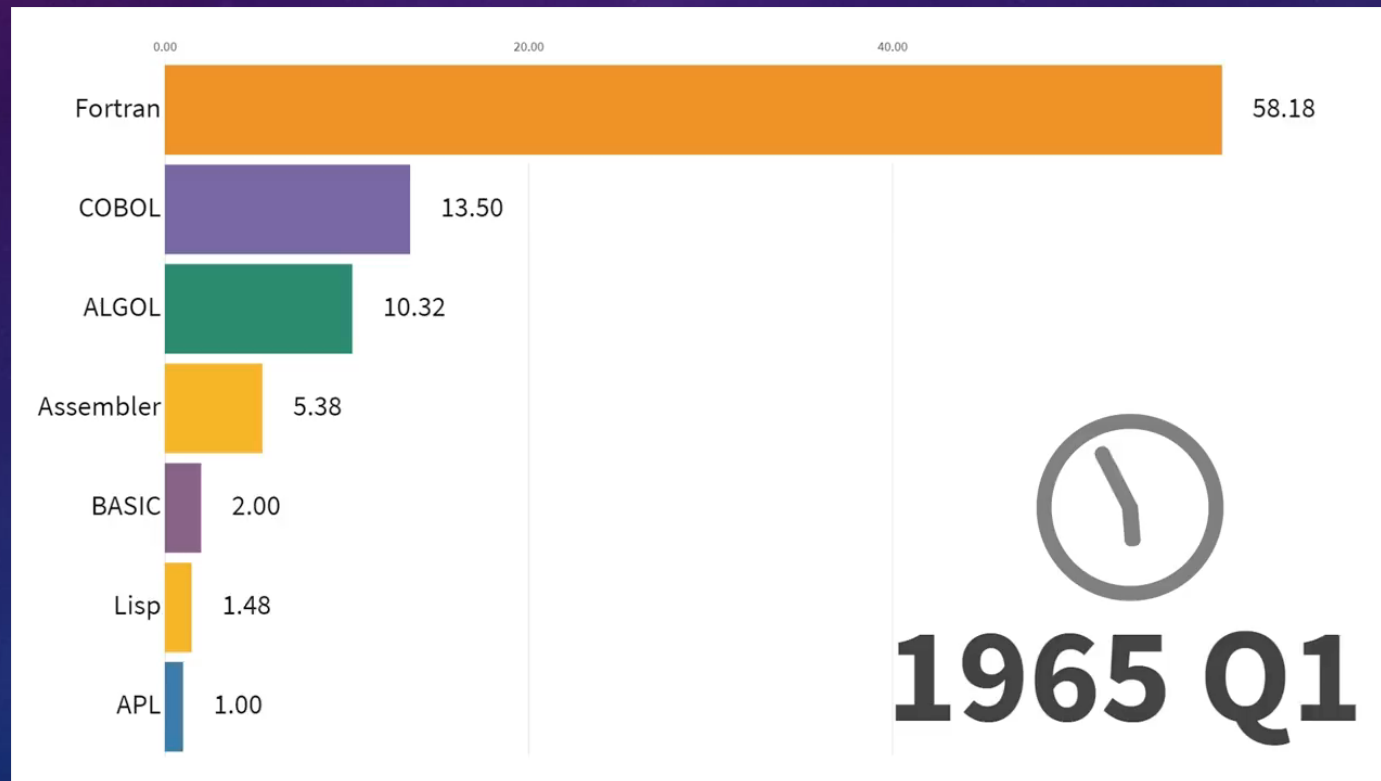
INTRODUCTION TO PYTHON IN SPATIAL ANALYTICS

PYTHON

Programming language with the most number of users.

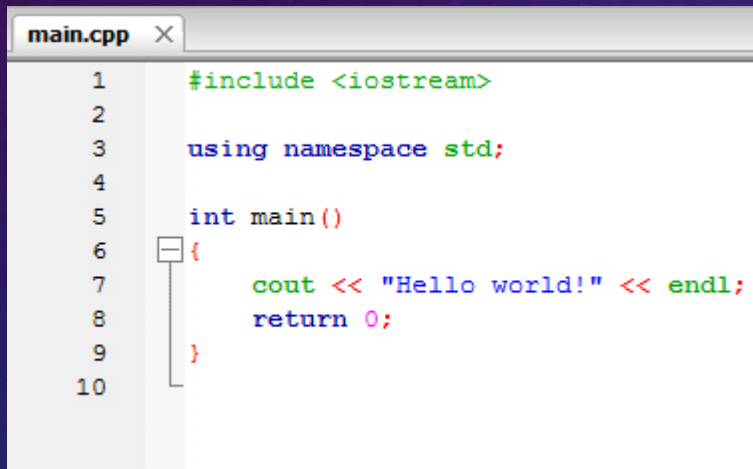
PYTHON

Programming language with the most number of users.



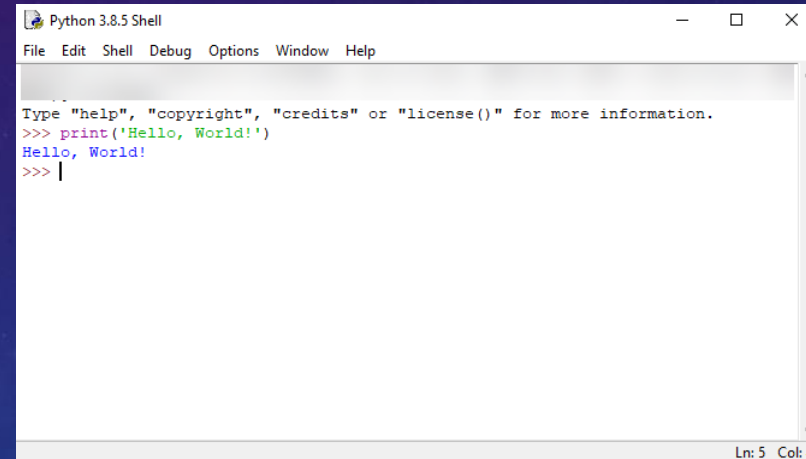
WHY TRENDING?

#1 *The language is easy to understand instead of other programming language*



```
main.cpp x
1  #include <iostream>
2
3  using namespace std;
4
5  int main()
6  {
7      cout << "Hello world!" << endl;
8      return 0;
9  }
10
```

C++



```
Python 3.8.5 Shell
File Edit Shell Debug Options Window Help

Type "help", "copyright", "credits" or "license()" for more information.
>>> print('Hello, World!')
Hello, World!
>>> |
```

Python

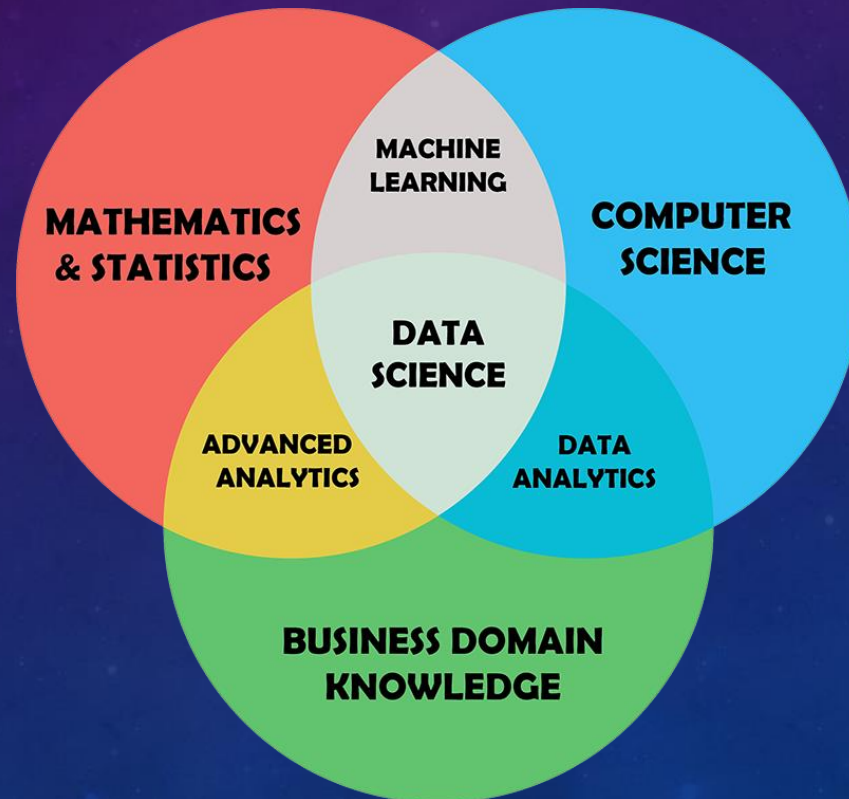
The language is close to human language rather than machine language

WHY TRENDING?

#2 *The user comes from various background*

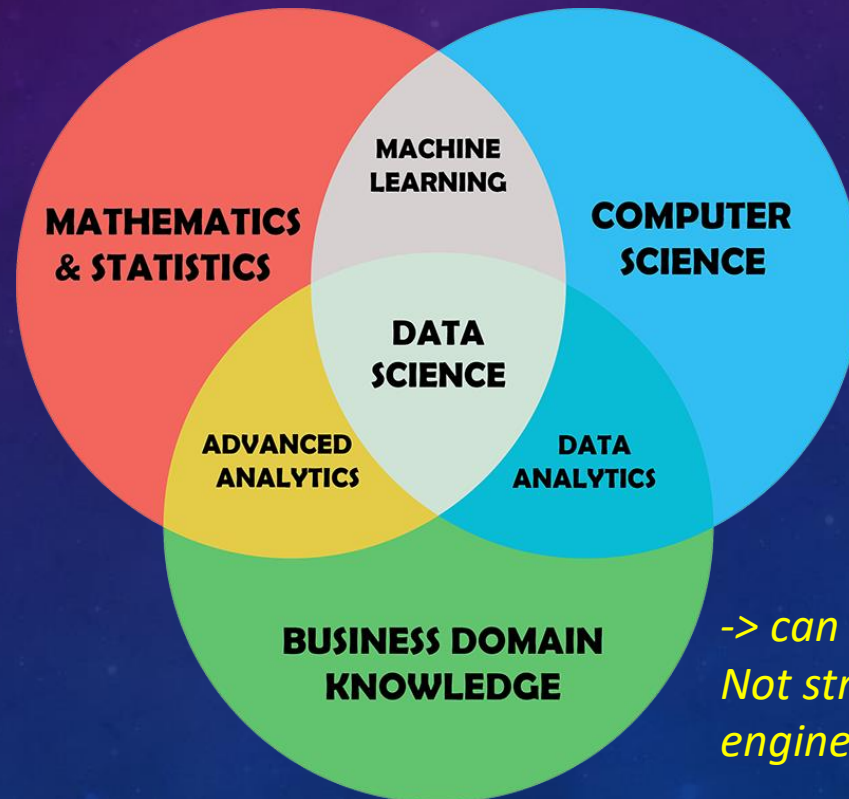
WHY TRENDING?

#2 *The user comes from various background*



WHY TRENDING?

#2 *The user comes from various background*



*-> can be used by anyone
Not strict to computer scientist/software engineering*

PYTHON IN SPATIAL SCIENCE

From GIS software background

- *Tools to automate workflow, reduce repeating GIS engineer tasks*

From open-source GIS background

- *Tools to visualize and analyze data*

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Ex: Logistic company (daily routine)

- Capture GPS data of its logistic trucks
- Cleaning the data
- Separate data by day to see trucks performance
- Analyze data

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Repeat
every day



PYTHON LIBRARIES



- *Need license (paid)*
- *Easy integration with other Python libraries + ArcGIS solutions*
- *As powerful as ArcGIS software (complete analysis package)*
- *Easy to manage large spatial database*



- *Open source (free)*
- *Easy integration with other Python libraries + ArcGIS solutions -> **make sure same data format***
- *Limited capabilities in analysis*
- *Not easy to manage large spatial database*

ESRI PYTHON LIBRARIES

ArcPy

- *To automate analysis package inside ArcMap/ArcGIS Pro*

Arcgis

- *Limited analysis tool*
- *To manage spatial data in ArcGIS Online (Esri's cloud system)*

PYTHON INGREDIENTS

Recipe

Ingredients

Instructions

Python Script

Data types

Statements &
functions

- *List*
- *Array*
- *String*
- *Integer*
- *Etc.*

- *Assignment*
- *Math operation*
- *Call library*
- *If-Else*
- *Loop*

INTEGRATED DEVELOPMENT ENVIRONMENT (IDE)



Write Code

Run Code

Debug Code

INTEGRATED DEVELOPMENT ENVIRONMENT (IDE)



*Jupyter Notebook
On Premise*



*Google Colab
On Cloud*

- **Dari perspektif GIS software user, apa yang menjadi kelebihan utama dari penggunaan Python?**

- a.) Mengotomasi pekerjaan rutin
- b.) Memvisualisasikan data

- **Sebutkan dua library Python yang dimiliki oleh ArcGIS!**

- a.) ArcPy dan GeoPandas
- b.) ArcPy dan Arcgis

- **Manakah IDE Python di bawah ini yang bersifat on cloud?**

- a.) Jupyter Notebook
- b.) Google Colab

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- b.) Google Colab

EXERCISE 1

1. Download intro_python_spatial_analytics on Github and save on specific folder

The screenshot shows the GitHub interface for the repository 'lucassuryana / intro_python_spatial_analytics'. The 'Code' tab is active, displaying a list of files and a 'Download ZIP' button highlighted with a red box. The repository has 1 branch and 0 tags. The file list includes:

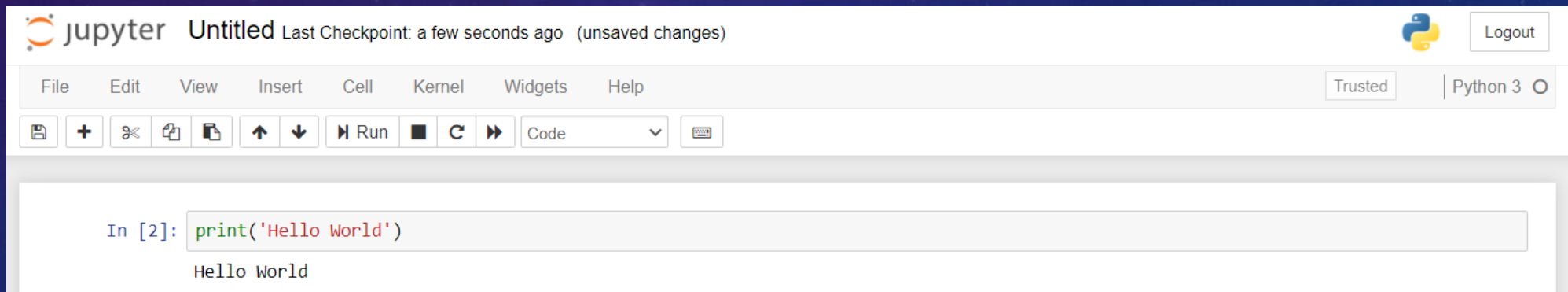
File Name	Action	Time
Provinsi	Add files via upload	
Laporan_Nasional_RKD2018_FINAL.pdf	Add files via upload	
Python Installation Procedure.pdf	Add files via upload	
Python for Spatial Analytics.pdf	Add files via upload	
Python_for_Spatial_Analytics.ipynb	Created using Colaboratory	
README.md	Update README.md	20 days ago
Tabula Installation Procedure.pdf	Add files via upload	2 months ago
Tabula_Python_for_Spatial_Analytics.i...	Created using Colaboratory	20 days ago
Tabula_Risksdas_Python.csv	Add files via upload	20 days ago

The 'Download ZIP' button is located in the 'Code' dropdown menu, which also includes options for cloning the repository using HTTPS, SSH, or GitHub CLI, and opening it with GitHub Desktop.

2. Open “Python Installation Procedure.pdf” and follow the steps until open jupyter notebook

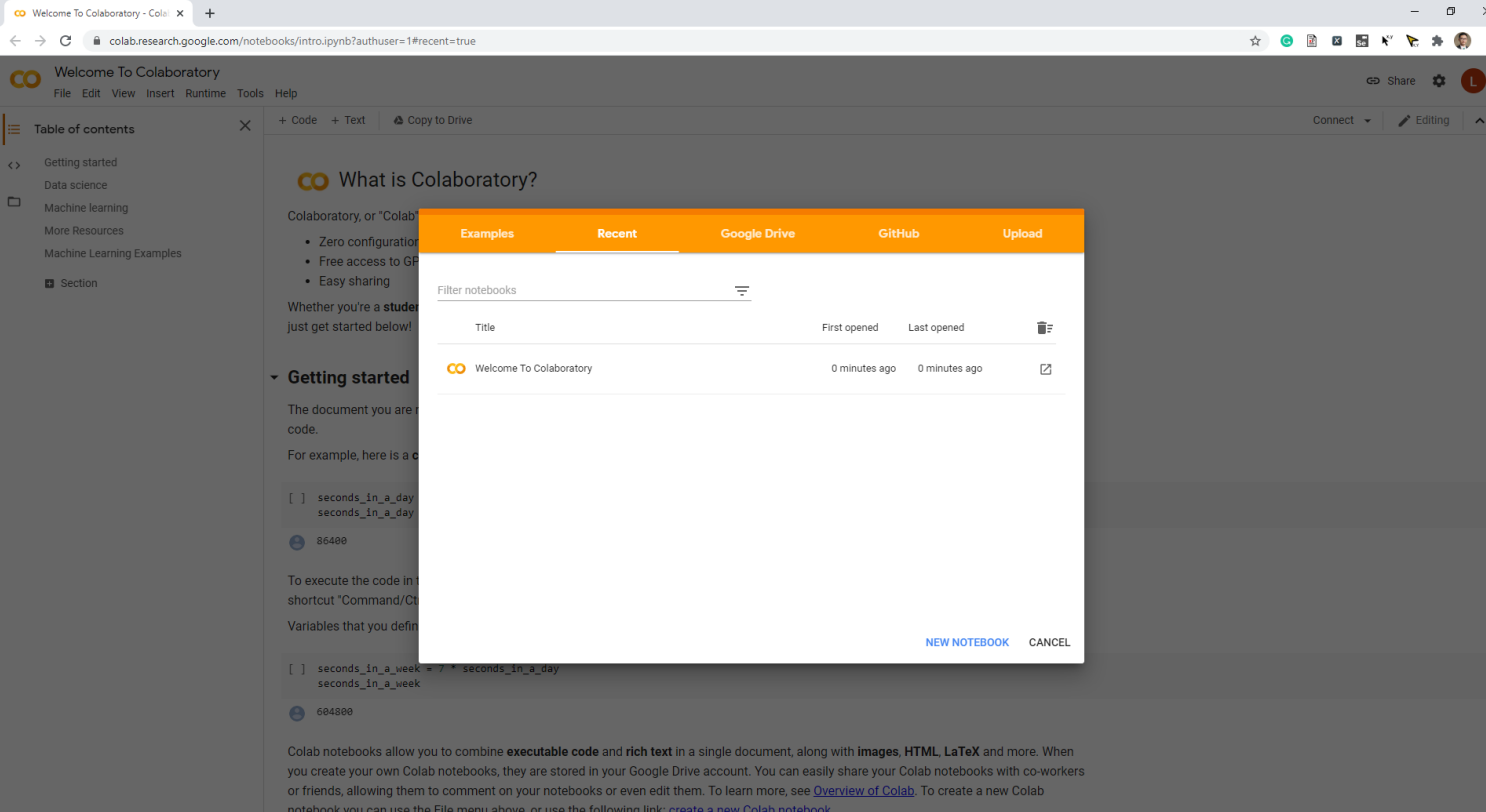


3. Choose folder you want to work with and klik new -> Python 3
4. Type print('Hello World')



EXERCISE 2

1. Type `print('Hello World')`

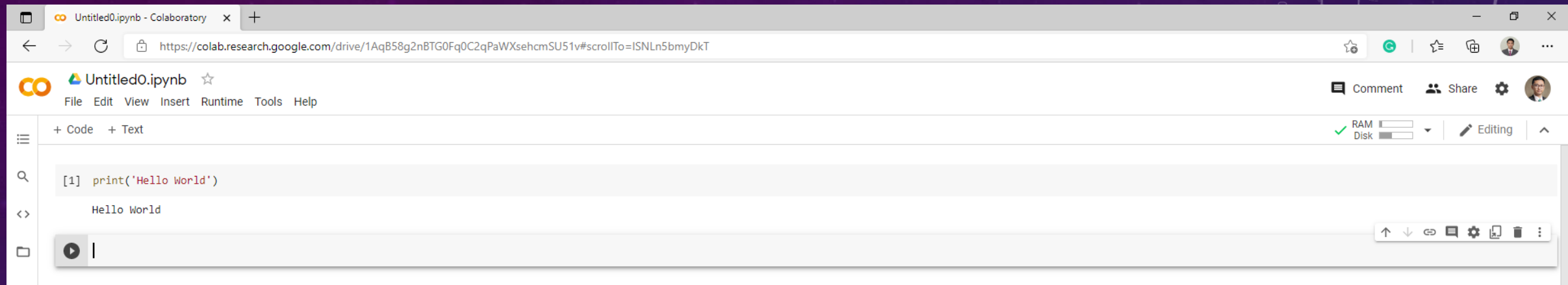


The screenshot shows the Google Colaboratory web interface. The main content area displays the 'Welcome To Colaboratory' message. A modal window is open, showing a table of recent notebooks. The table has columns for 'Examples', 'Recent', 'Google Drive', 'GitHub', and 'Upload'. The 'Recent' tab is selected, and the table lists the 'Welcome To Colaboratory' notebook, which was opened 0 minutes ago. The modal also includes a search bar and a 'NEW NOTEBOOK' button.

Examples	Recent	Google Drive	GitHub	Upload
Filter notebooks				
Title	First opened	Last opened		
Welcome To Colaboratory	0 minutes ago	0 minutes ago		

NEW NOTEBOOK CANCEL

2. Type print('Hello World')



The screenshot shows a web browser window with a Google Colaboratory notebook. The browser's address bar displays the URL: <https://colab.research.google.com/drive/1AqB58g2nBTG0Fq0C2qPaWXsehcmSU51v#scrollTo=ISNLn5bmyDkT>. The notebook interface includes a top menu bar with 'File', 'Edit', 'View', 'Insert', 'Runtime', 'Tools', and 'Help'. Below the menu, there are tabs for '+ Code' and '+ Text'. On the right side of the interface, there are icons for 'Comment', 'Share', and 'Settings', along with a status bar showing 'RAM' and 'Disk' usage, and a 'Editing' mode indicator. The main code area contains a single cell with the following content:

```
[1] print('Hello World')
```

Below the code input, the output of the cell is displayed as 'Hello World'. At the bottom of the cell, there is a play button icon and a vertical line, indicating that the code has been executed successfully.

USE CASE: RISKESDAS DATA

WORKING PROCEDURE

