Data on Fire: A Hands-On Intro to Spark in Fabric

SQL Saturday Orlando 2025

Jason Romans

Cloud Data & Integration Developer

The DAX Shepherd

Microsoft® MVP Most Valuable Professional

@sql_jar

jason-r-sql-jar

https://thedaxshepherd.com/

📍 Nashville, TN, USA

🛠️ Began Career as a SQL Server DBA

➡️ Transitioned to Microsoft BI Stack

📦 Data Engineering to Data Modeling

✒️ Infrequent Blogger

🧭 Fan of Dimensional Models & Doctor Who

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www.thedaxshepherd.com

Slides

The DAX Shepherd

Musings on the Microsoft BI Stack

Home | About Me | Simple Talk | Presentations | A Speaker's Journey

Presentations

Sessionize

This is my Sessionize Profile that has the conferences I have spoken at along with future events. It has a couple of my most popular sessions.

Presentation Slides

This is my GitHub Repository with the presentation slides for each event.

Recorded Sessions

Simple Talks Podcast | Episode 4 – Coffee chat with Jason Romans

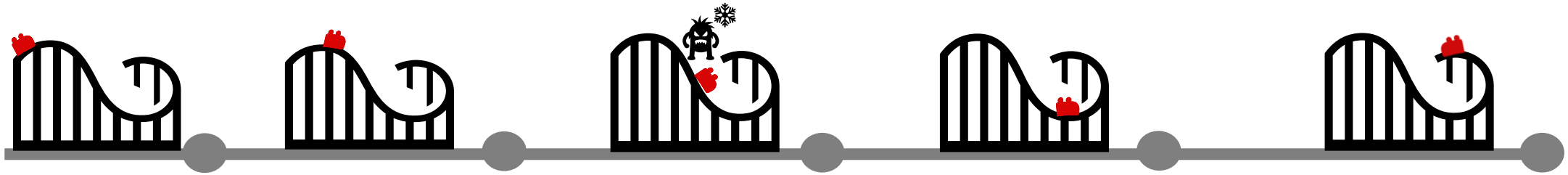
About Jason Romans

I love working with the Microsoft BI Stack. I am passionate about learning.

A Speaker's Journey

Shoulders of Giants

Our Journey



1. Intro
2. Python
3. PySpark
4. Uses
5. Conclusion

Our Journey

1. **Intro**
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What lit the fire for Apache Spark

The Netflix Prize

Began Oct 2006

Goal - improve Netflix's Cinematch algorithm by at least 10%

Prize was 1 million dollars

Took until 2009

Couldn’t the Elephant* Help?

Hadoop was not optimal for Machine Learning – multiple passes over disk

Need for new tooling

Shift to in-memory versus disk

Like Analysis Services Multi-Dimensional to Tabular

Contest must have led to work on Spark

*** Hadoop’s Mascot is an Elephant**

Flashbacks of submitting homework digitally

Front runner BellKor's Pragmatic Chaos

Merger of teams from AT&A Labs and Commendo Research

July 26, 2009 two teams met minimum requirements

The Ensemble (Spark team) had a better improvement in score

Lost by submitting 20 minutes later

What is Powered by Spark

- Apache Spark
- Azure Synapse Analytics
- Databricks
- Microsoft Fabric

Installing Spark
Step 1 of 42

```
$ pip install pyspark
No-module named pip;
 ModuleNotFoundError
Error importing setuptools module:
  Install' command is unavailable until setuptools is
Ensure pip, setuptols, and wheel are up to date
  For "upgrode spark pip.ptgspec "ll ergk!
Upgrade pyspark --no-cache-dir setuptools  wheel
Value for scheme.headers does not match
  to avoid this problem; ȣf errcode, with exame>
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 annotate; error: (versygtut), line 230, init _eforl
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  trod self.s.connect(sockaddr cannec) timeout
File '/usr/lib/python3.8/soket.py', line 26,i meth
   self.s.connect(sockaddr)
Interna to an attack                  involve nexit
Collecting pyspark _apack-3.2.1-bin-hadoopg.3.2.cg inT
Downloading Apache-spark-3.2.1-i-nstaller
 error Value for scheme.headers does not matchcs ae' matc
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Retrying (Retry(total=<connect=,) after Excepption annotate
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confirming)  package falled: There was a p:'_crobiem-c t
Exception Coo problen confirming the ssl certificate: HTTTPS
ssl-certificate:mTTTPSconnectiunool Connection annicatetot/
(host=`>>`https:/pjpu_l.jsomsohts> HTTPSConnecrinPool(mol
Could not install pagages due to an ᵛo space on device
[Errno 28) no insstall paccages due to an an an OSEserer:
```

Wait! Microsoft Fabric makes this easy

Notebooks in Microsoft Fabric

Can apply to other environments

Notebook Gallery

https://community.fabric.microsoft.com/t5/Notebook-Gallery/bd-p/pbi_notebookgallery

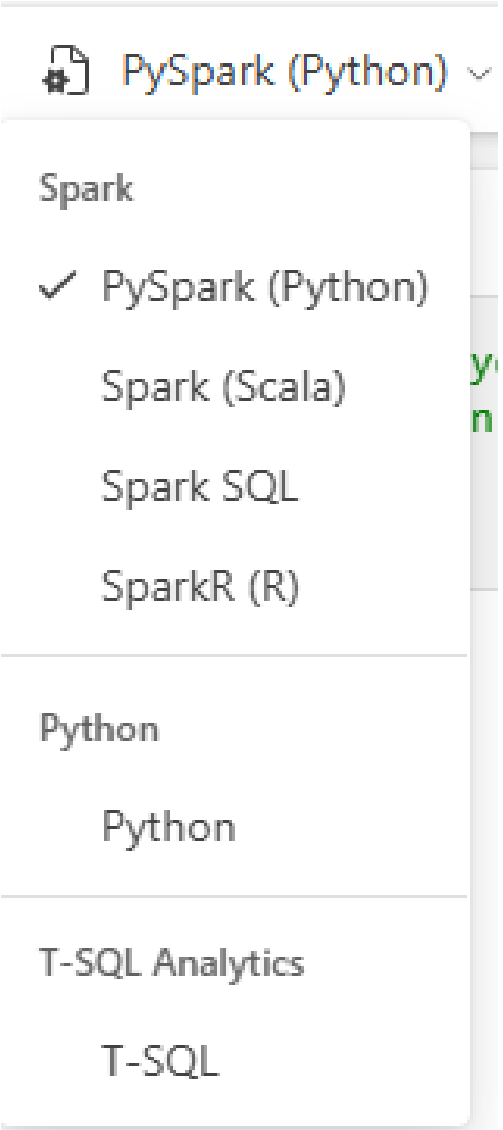
There was a notebook contest (it is closed now):

https://powerbi.microsoft.com/en-us/blog/introducing-the-first-ever-fabric-notebooks-competition-for-power-bi/

Microsoft Fabric Architecture

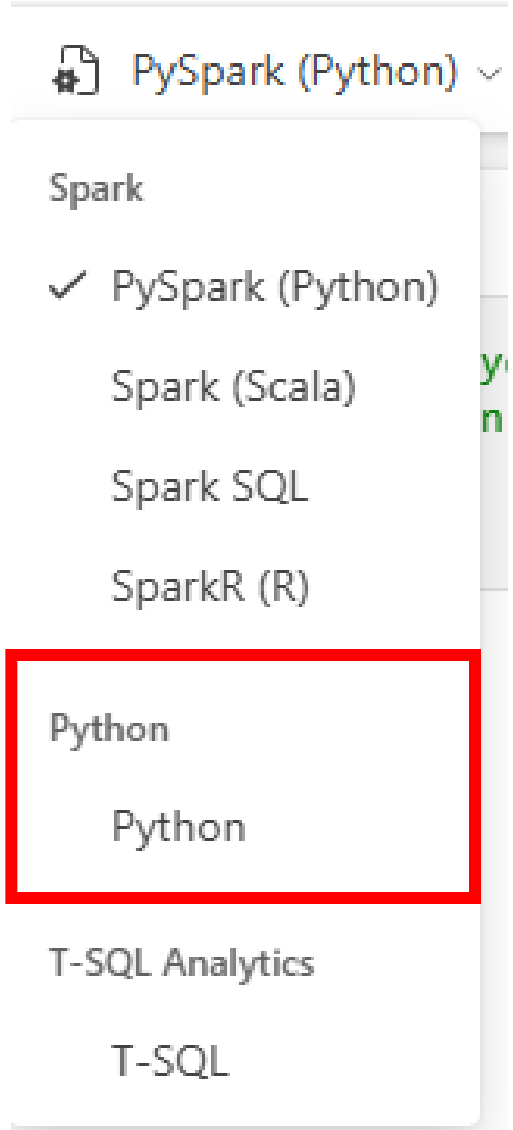
- Data is stored in OneLake (Files)
- Compute engines sitting on top of files
- Languages and compute
  - i.e. T-SQL with Warehouse

Compute & Language

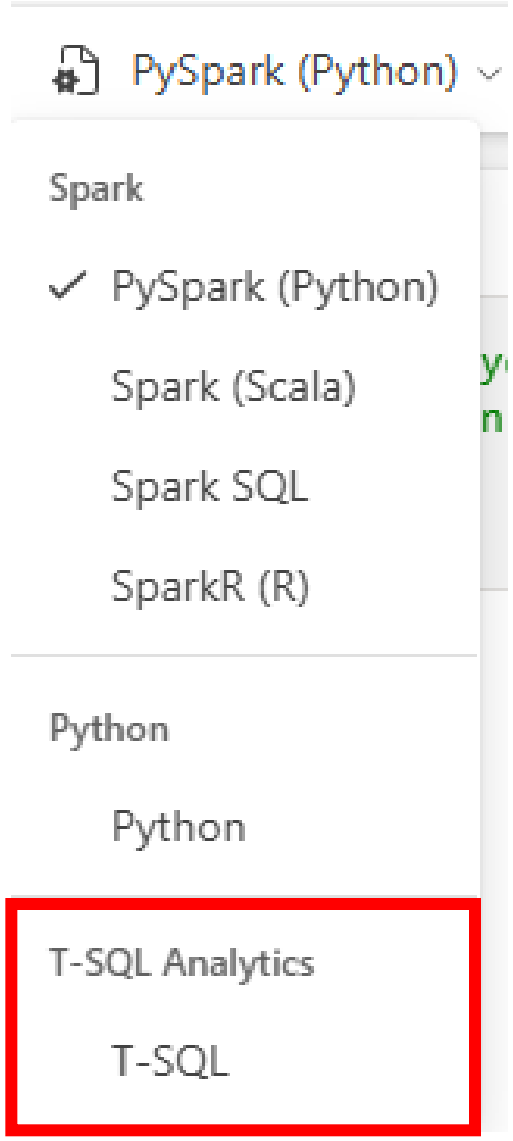


Spark
(Python, Scala, SQL, R)

Python (Python)



T-SQL Analytics (T-SQL)



Choosing PySpark or Python Compute (quick)

Scenario	Recommended Notebook
Includes pre-installed DuckDB and Polars libraries	Python Notebooks
Small to medium data (fits in memory)	Python Notebooks (or PySpark on single-node Spark cluster)
Rapid exploration & prototyping	Python Notebooks (or PySpark on single-node Spark cluster)
Large datasets (10GB+) exceeding memory	PySpark Notebooks
Complex data workflows or ETL pipelines	PySpark Notebooks
High-concurrency or parallel execution	PySpark Notebooks
Needs Spark-native APIs (MLlib, SQL, Streaming)	PySpark Notebooks

https://learn.microsoft.com/en-us/fabric/data-engineering/fabric-notebook-selection-guide

Choosing PySpark or Python Compute

Scenario	Python Notebooks (2-core VM)	PySpark Notebooks (Spark Compute)
Startup Time	The built-in starter pool initializes in approximately 5 seconds, while the on-demand pool takes around 3 minutes.	Start-up ranges from ~5 seconds (starter pool) to several minutes (on-demand Spark clusters).
Quick Transformations & API Calls	Ideal for small to medium sized datasets (up to 1GB)	Optimized for large datasets using vectorized execution.
Moderate Workloads	Not optimized for data sizes nearing memory saturation	Efficient at scaling via distributed compute.
Handling of Large Datasets	Limited by single-node memory. May struggle with scaling.	Distributed processing ensures scalable handling of multi-GB to TB workloads.
High-Concurrency Execution	Manual FIFO-style parallelism per notebook	System-managed concurrency with support for parallel execution.
Resource Customization & Scaling	Fixed compute (2-core VM); does not auto scale. Users can manually scale out using %%config within the notebook.	Flexible resource allocation; supports autoscaling and custom Spark configurations.

https://learn.microsoft.com/en-us/fabric/data-engineering/fabric-notebook-selection-guide

Type of Compute for Notebooks

- Spark Based
  - Cluster
- Single Node Python
  - 2 vCores, 16G RAM
- T-SQL Analytics
  - Warehouse

Python Notebook

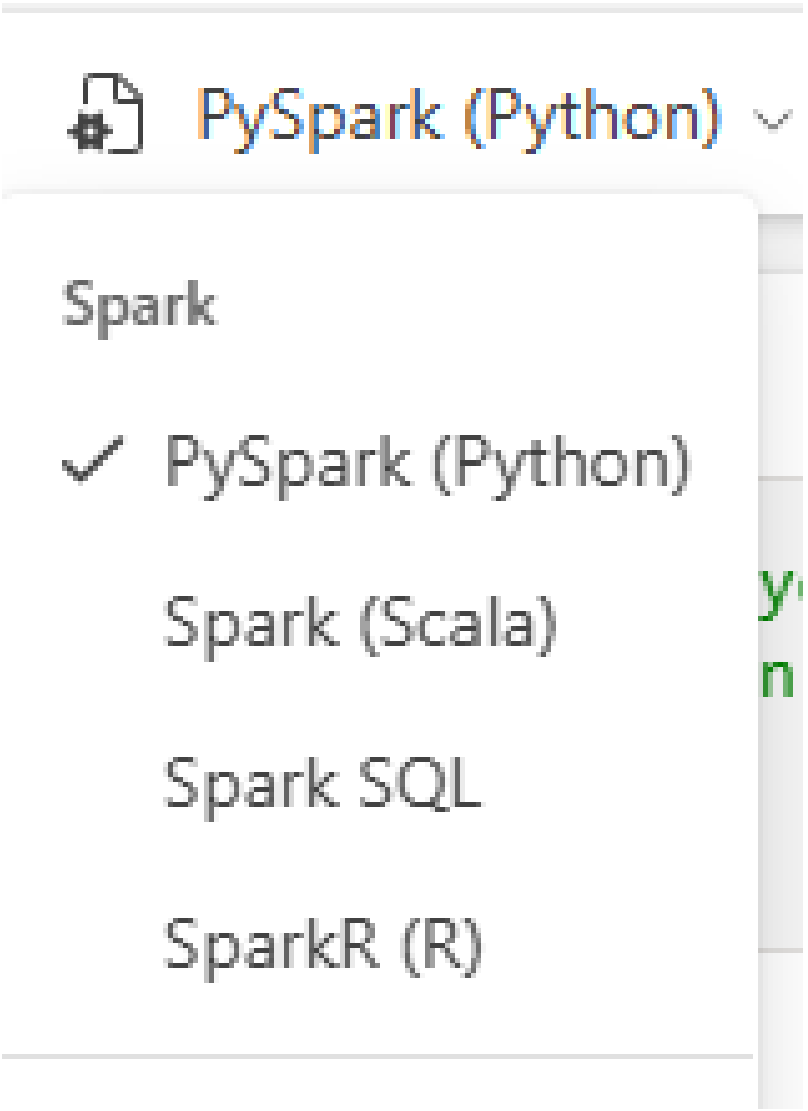
- Has libraries installed for dealing with “small-big” data
  - Less than 10 Gigabytes
  - Fits in memory
- Example Libraries installed
  - Polars
  - DuckDB

Languages for Spark

Different choices of languages

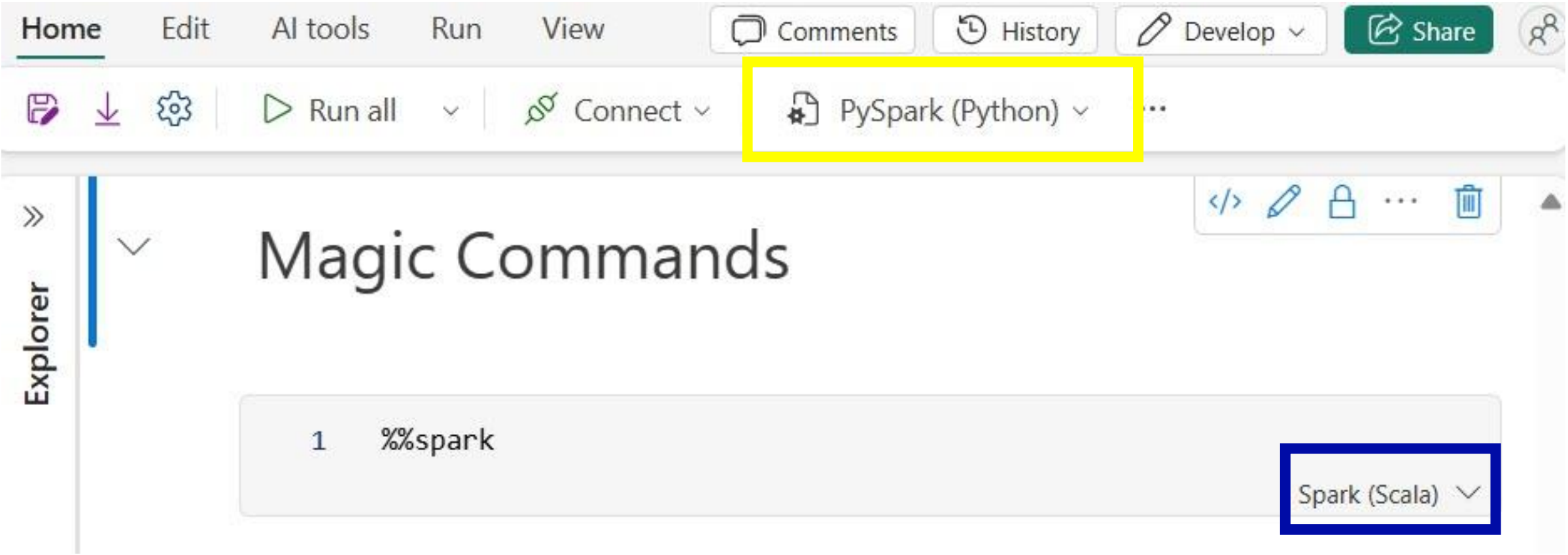
Built with Scala

- PySpark (Python)
- Spark (Scala)
- Spark SQL
- SparkR (R)

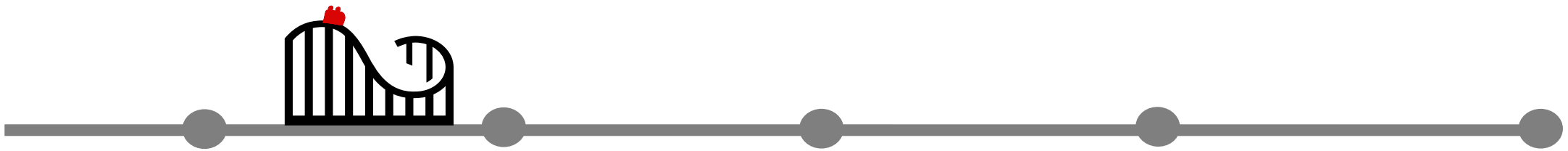


Magic Commands – set language by cell

Magic command	Language	Description
%%pyspark	Python	Execute a **Python** query against Apache Spark Context.
%%spark	Scala	Execute a **Scala** query against Apache Spark Context.
%%sql	SparkSQL	Execute a **SparkSQL** query against Apache Spark Context.
%%html	Html	Execute n **HTML** query against Apache Spark Context.
%%sparkr	R	Execute a **R** query against Apache Spark Context.


Home
Edit
AI tools
Run
View
Comments
History
Develop
Share
Run all
Connect
PySpark (Python)
Explorer
Magic Commands
1 %%spark
Spark (Scala)

Our Journey



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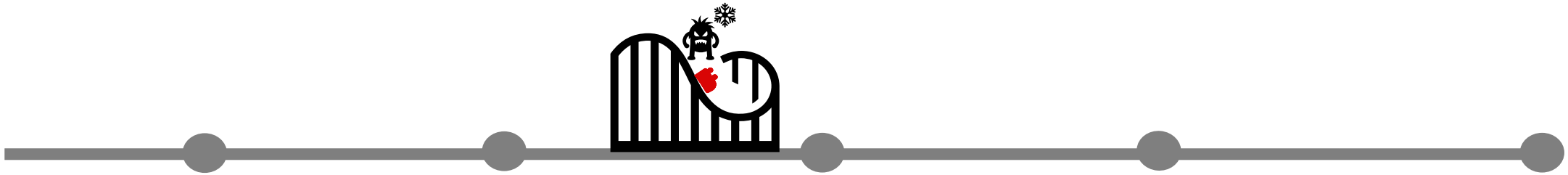
Python Language

HOW YOU INTERACT
WITH SPARK

HOW YOU MANIPULATE
THE DATA

Python Demo

Our Journey



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PySpark

Python API for Spark

Most operations on a DataFrame

Like Pandas but distributed

DataFrame

- Conceptually same as a table
  - Abstraction
  - Rows
  - Columns
- Resilient Distributed Dataset (RDD)

Spark is Lazy – in a good way

Lazy Evaluation

- Waits until an action is requested
- Actions
  - Counting number of rows in a Spark DataFrame
  - Showing output
  - Writing data to a file or data source
  - Transferring data from a Spark DataFrame to a native object in Python

Benefits of Lazy Evaluation

- Saves resources
- Plan can be optimized

Pandas (non-spark, historic) is eager evaluation

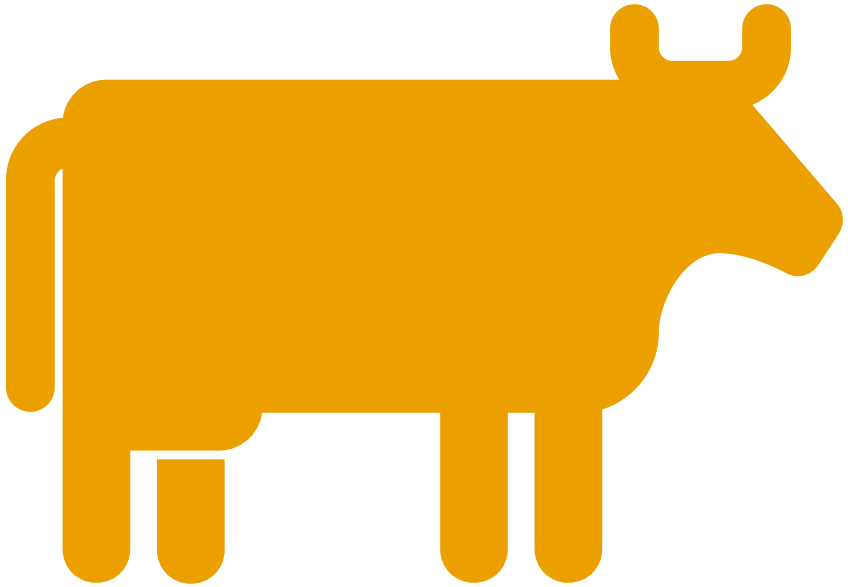
Fabric in Visual Studio Code

EDIT NOTEBOOKS

CONNECT TO COMPUTE
IN MICROSOFT FABRIC

Data Wrangler

Think Power Query but for PySpark and Python



PySpark Demo

Our Journey

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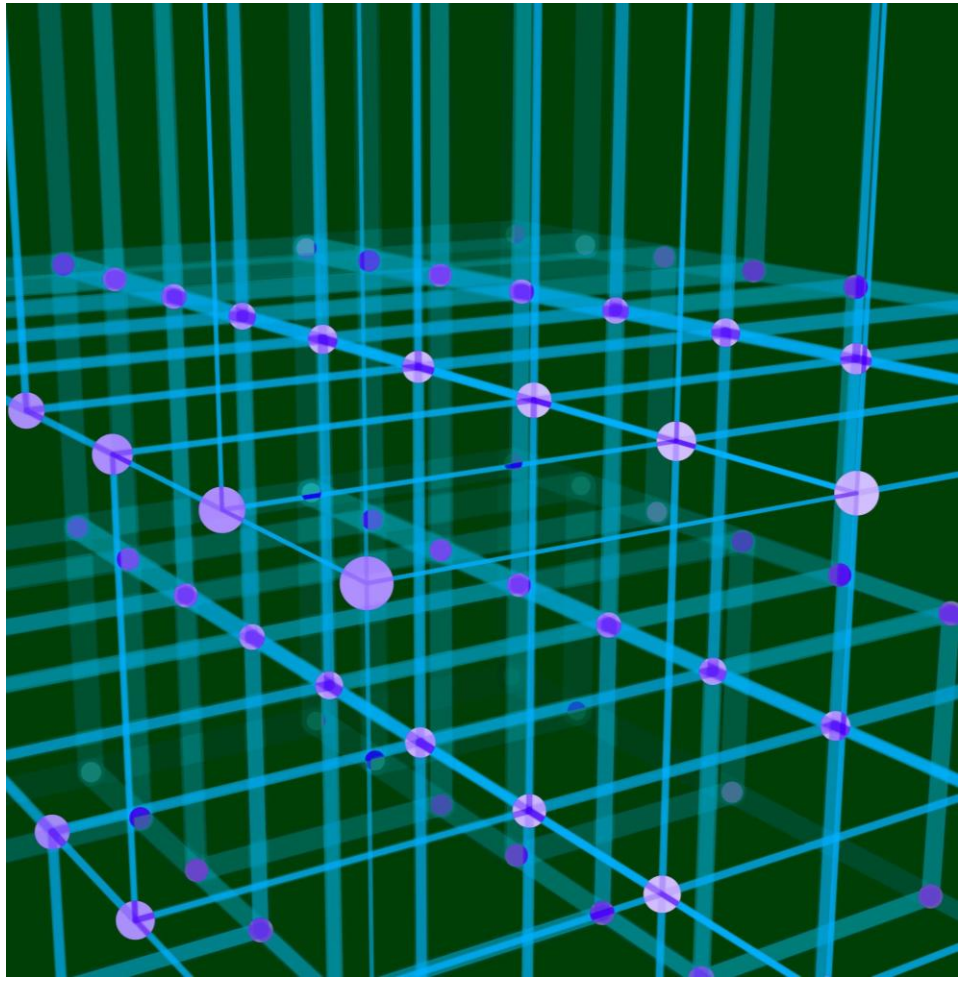
Main Use

Consume and transform large amount of data

Machine Learning

Semantic Link

Semantic Link Labs



Semantic Link Demo

Resources

Fabric Samples

- https://github.com/microsoft/fabric-samples

- Semantic Link
  - https://learn.microsoft.com/en-us/fabric/data-science/semantic-link-overview

- Semantic Link Labs
  - https://github.com/microsoft/semantic-link-labs

Resources

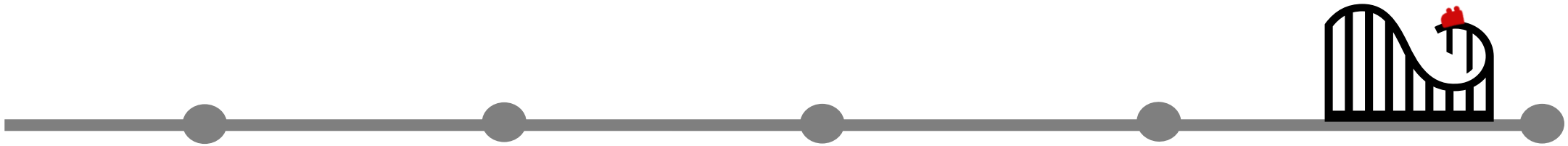
PySpark Book – Data Analysis with Python and PySpark

- https://www.oreilly.com/library/view/data-analysis-with/9781617297205/

PySpark Book – Intro to PySpark (Free HTML version)

- https://pedropark99.github.io/Introd-pyspark/

Our Journey



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Conclusion

Powerful and Scalable Platform

Apache Spark in Microsoft Fabric Notebooks provides a robust and scalable solution for handling big data analytics tasks efficiently.

User-Friendly Tools

The platform offers intuitive and practical tools that simplify data analysis for professionals of all skill levels.

Unlocking Valuable Insights

Understanding core concepts and leveraging these tools enables data professionals to extract meaningful insights effectively.

SQLSATURDAY

OCT 4TH 2025

Orlando, FL

SQLOrlando

Scan the QR code to fill out session evaluations

Thank you

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