

RAPIDS: GPU Acceleration Setup & Installation Guide

RAPIDS 실습 환경 준비하기

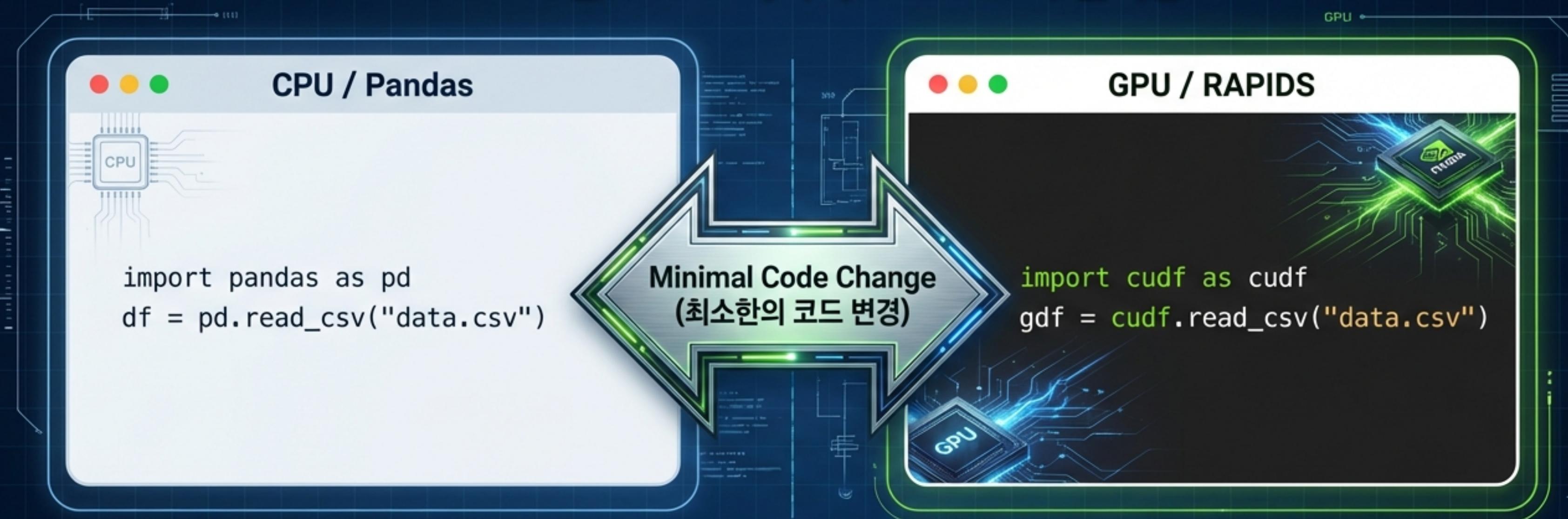
From Environment Setup to Data Analysis (환경 설정부터 데이터 분석까지)



This guide functions as a decision tree. Navigate to the section that matches your hardware and goals.
(이 가이드는 사용자의 하드웨어 및 목표에 맞는 설치 방법을 안내하는 네비게이터 역할을 합니다.)

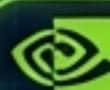
The Promise: GPU Speed, Pandas Ease

RAPIDS란? GPU 가속과 Pandas의 편의성



RAPIDS is an open-source GPU-accelerated data analytics library developed by NVIDIA.
(RAPIDS는 NVIDIA가 개발한 오픈소스 GPU 가속 데이터 분석 라이브러리입니다.)

It provides the same API as pandas and scikit-learn. (pandas, scikit-learn과 동일한 API를 제공합니다.)



Zero logic change, 100x acceleration. (로직 변경 없이, GPU 가속 성능 확보.)

Critical Concepts & Hardware Requirements

핵심 용어 및 요구사항

Two Key Terms (기억해야 할 2가지 핵심 용어)



CUDA

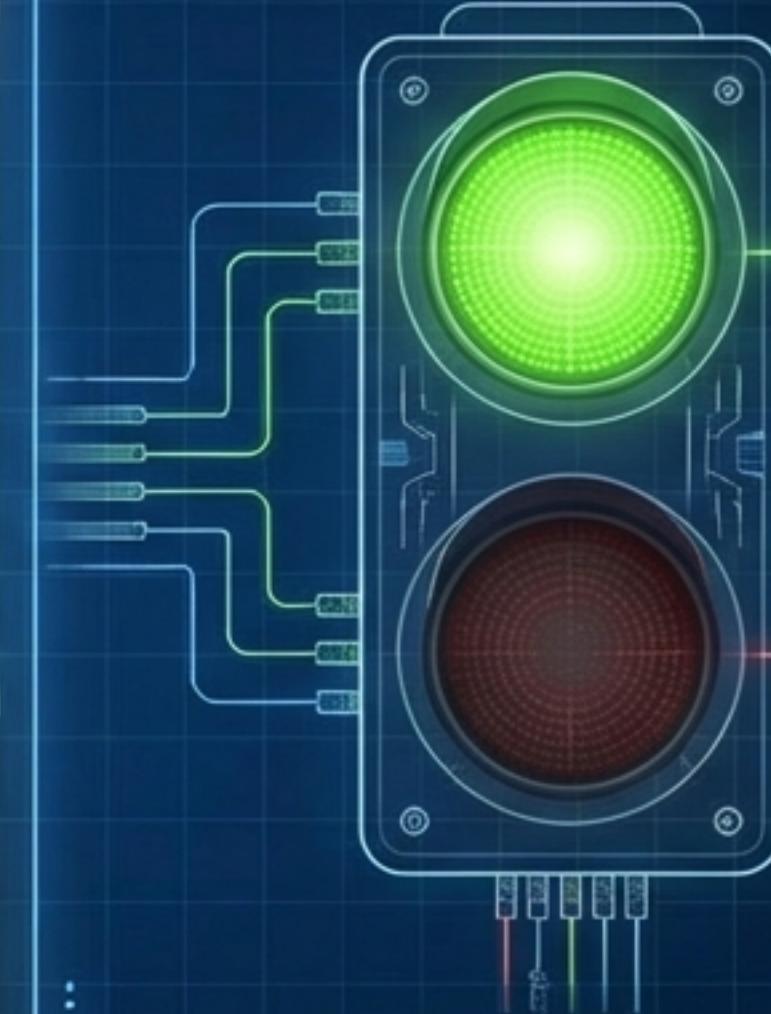
The platform for parallel computing on NVIDIA GPUs.
(NVIDIA GPU에서 병렬 연산을 실행하기 위한 플랫폼.)



Compute Capability

The feature version of the GPU.
RAPIDS requires **7.0 or higher**.
(GPU의 기능 수준을 나타내는 버전 번호.
RAPIDS는 7.0 이상 필요.)

Traffic Light



Supported (지원)

- RTX 20/30/40 Series,
GTX 16 Series

Unsupported (미지원)

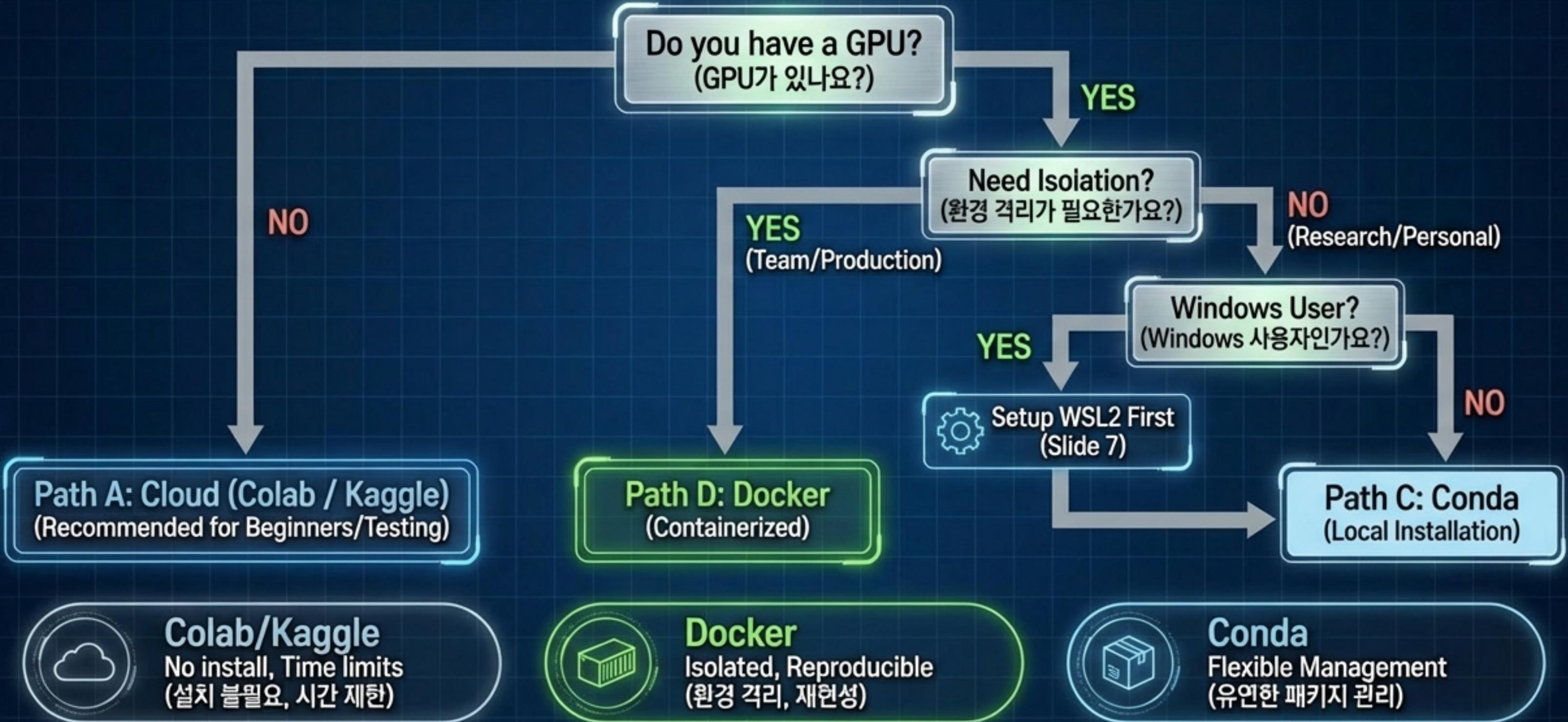
- GTX 10 Series or older



If your hardware is in the Red Light zone, please proceed to the Cloud Environment section.
(지원되지 않는 하드웨어 사용자는 클라우드 환경 섹션으로 이동하십시오.)

Choose Your Installation Path

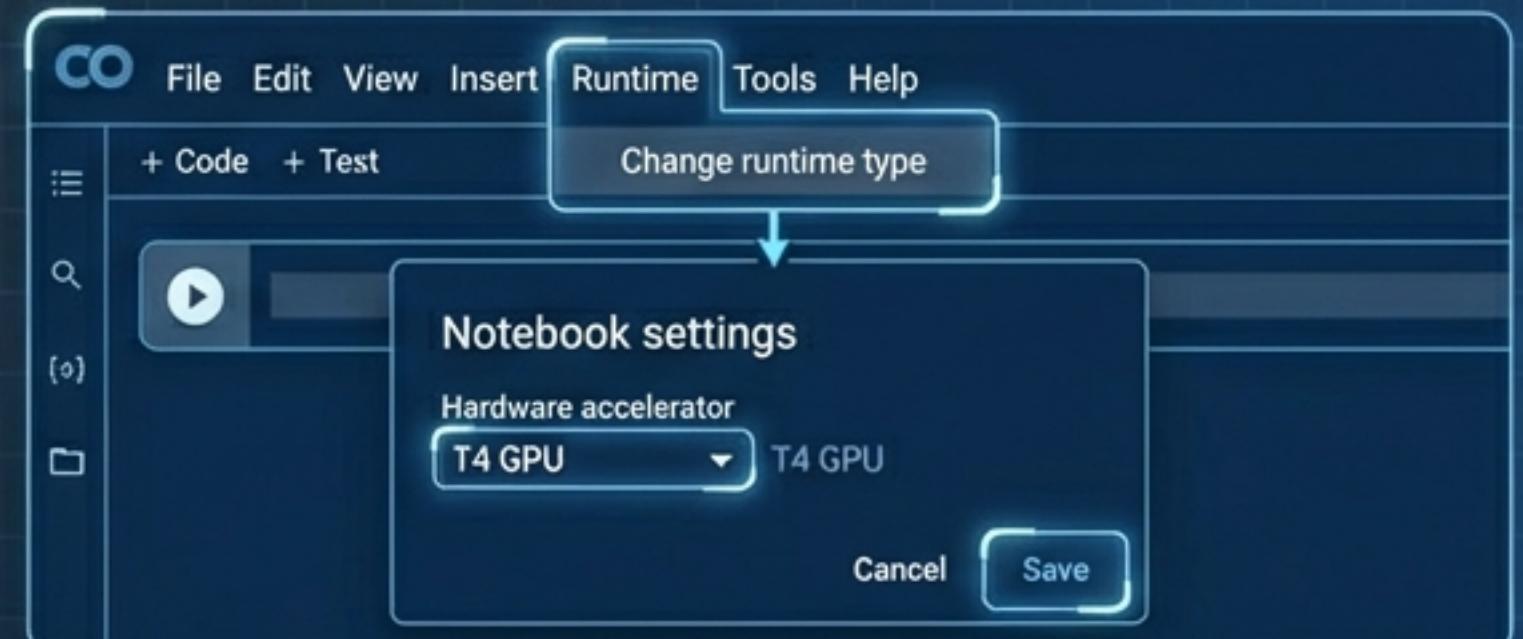
설치 방법 선택 가이드



Path A: Cloud Environments

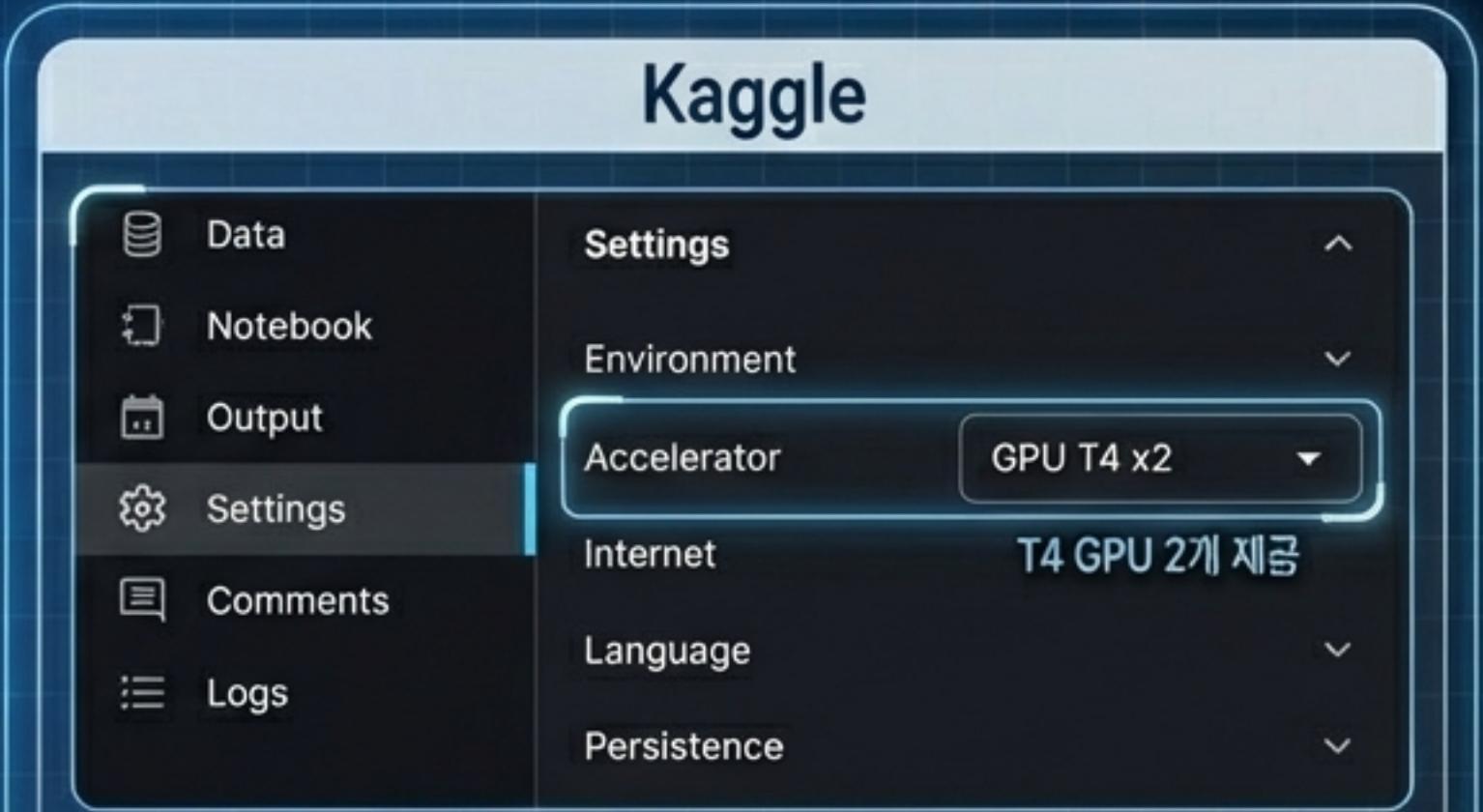
클라우드 환경 - Colab & Kaggle

Google Colab



- Action: Menu > Runtime > Change Runtime Type > Select T4 GPU.
(상단 런타임 → 런타임 유형 변경 → T4 GPU 선택 후 저장.)
- Note: cuDF is pre-installed. (cuDF 기본 포함.)
- Constraint: Free session limited to 12 hours. (무료 세션 12시간 제한.)

Kaggle



- Action: Settings > Accelerator > Select GPU T4 x2.
(Settings → Accelerator → GPU T4 x2 선택.)
- Benefit: Provides dual T4 GPUs. (T4 GPU 2개 제공.)

```
import cudf  
gdf = cudf.DataFrame({"a": [1, 2, 3]})  
print(gdf)
```

Path B: System Check

내 환경 확인하기 - nvidia-smi

```
Terminal - bash
+---+
| NVIDIA-SMI 535.104.05 | Driver Version: 535.104.05 | CUDA Version: 12.2 |
+---+
| GPU Name Persistence-M | Bus-Id Disp.A | Volatile Uncorr. ECC |
| Fan Temp Perf Pwr:Usage/Cap | Memory-Usage | GPU-Util Compute M. |
+---+
| 0 NVIDIA GeForce RTX 4090 Off | 00000000:01:00.0 On | N/A |
```

Driver Version:

Check compatibility.
(CUDA 12.x needs
525.60+, CUDA 13.x
needs 580.65+.)

CUDA Version:

This is your ceiling.
(설치 시 이 버전 이하로
지정해야 합니다.)

GPU Name: Verify architecture.
(RTX 30/40, GTX 16 series confirmed.)

Run `nvidia-smi` in your terminal to generate this dashboard.

Windows Users: The WSL2 Bridge

Windows 사용자를 위한 WSL2 설정

RAPIDS does not run natively on Windows. You must install WSL2.
(RAPIDS는 Windows에서 직접 실행되지 않습니다. WSL2 설치가 필수입니다.)



Step 1: Install WSL (PowerShell Admin)

```
wsl --install Ubuntu-22.04  
wsl --update
```

Step 2: Driver & CUDA Setup (Inside WSL)

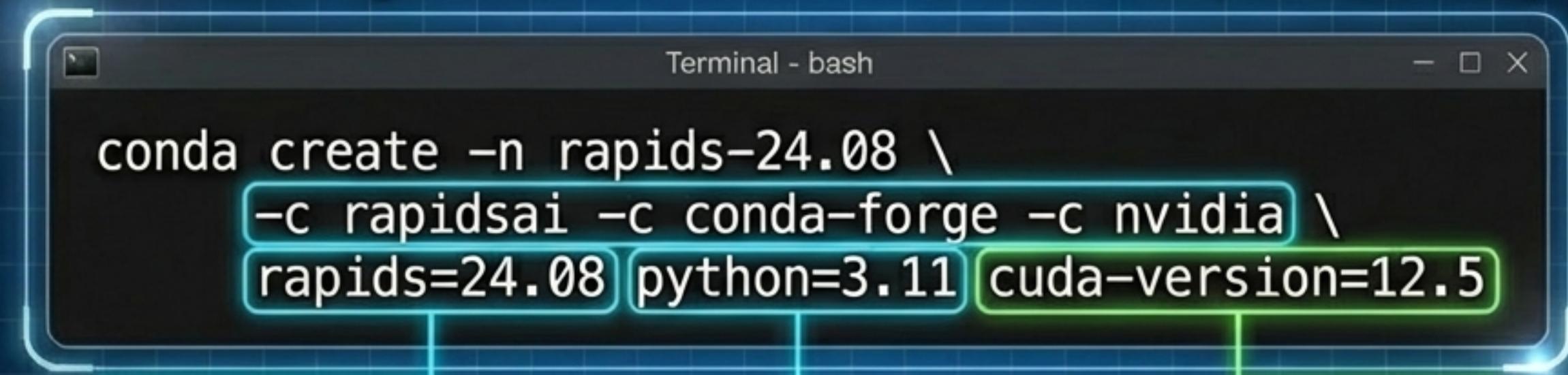
```
sudo apt update  
sudo apt install nvidia-driver-535  
# Install CUDA Toolkit for WSL (Refer to Docs)
```

After setup, proceed to Conda or Docker methods. (설치 완료 후 Conda 또는 Docker 방법으로 진행하십시오.)

Path C: Local Installation via Conda

Conda로 설치 (권장) - Individual Researchers

Step 1: Install Miniforge. Recommended over Anaconda for speed. (Miniforge 권장.)



```
Terminal - bash
conda create -n rapids-24.08 \
    -c rapidsai -c conda-forge -c nvidia \
    rapids=24.08 python=3.11 cuda-version=12.5
```

Channels: Must include
rapidsai, nvidia.

Target Version.

Crucial: Must be lower/equal to
system version.
(nvidia-smi에서 확인한 버전 이하로 지정.)

Step 4: Activate Environment

```
conda activate rapids-24.08
```

Path D: Containerization via Docker

Docker로 설치 - Teams & Production



```
docker run --gpus all -it -p 8888:8888 \
-v $(pwd):/rapids/notebooks/host \
nvcr.io/nvidia/rapidsai/base:24.12-cuda12.5-py3.12
```

- **--gpus all** : Passes all GPUs to the container.
(모든 GPU 사용.)
- **-p 8888:8888** : Exposes Jupyter Lab port.
(Jupyter Lab 포트 연결.)
- **-v** : Mounts current local directory.
(현재 로컬 디렉토리 마운트.)

Quick Reference Cheat Sheet

빠른 참조 가이드

Environment Check (환경 확인)

`nvidia-smi`

(GPU Check)

`nvcc --version`

(CUDA Toolkit)

`python -c "import cudf;
print(cudf.__version__)"`

(RAPIDS Ver)

Conda Management (Conda 관리)

`conda create -n [name] ...` (Create)

`conda activate [name]` (Activate)

`conda deactivate` (Deactivate)

`conda env list` (List Envs)



Pro Tip

Always check compatibility at docs.rapids.ai before installing.

(설치 전 항상 공식 문서에서 호환성 확인.)

FAQ & Troubleshooting

자주 묻는 질문 및 문제 해결

ISSUE

nvidia-smi fails.

FIX

Install driver from NVIDIA website.
(NVIDIA 공식 사이트에서 드라이버 설치.)

nvcc command not found.

Add /usr/local/cuda/bin to ~/.bashrc PATH.

Version Conflicts.

Ensure cuda-version in install command
matches nvidia-smi output.

WSL GPU not detected.

Upgrade to WSL2 (wsl --set-version Ubuntu-22.04 2).

Out of Memory (OOM).

Reduce batch size or kill other processes.
(배치 크기 축소 또는 프로세스 종료.)

Ready for Analysis

마무리 및 리소스

You have successfully configured your environment.

You are now ready to accelerate your data science workflows.

(환경 설정이 완료되었습니다. 이제 데이터 사이언스 워크플로우를 가속화할 준비가 되었습니다.)



docs.rapids.ai
(Official Installation Guide)



RAPIDS GitHub /
NVIDIA Developer Forums
(Community)

Start your first GPU dataframe today.

(오늘 바로 첫 번째 GPU 데이터프레임을 생성해 보세요.)