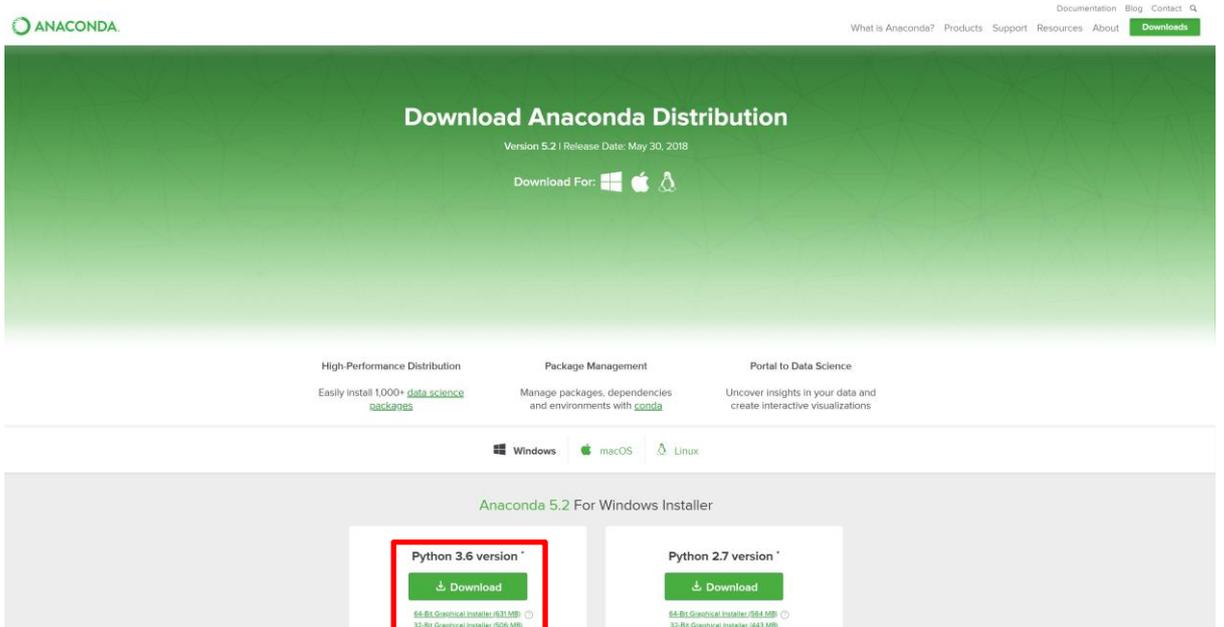


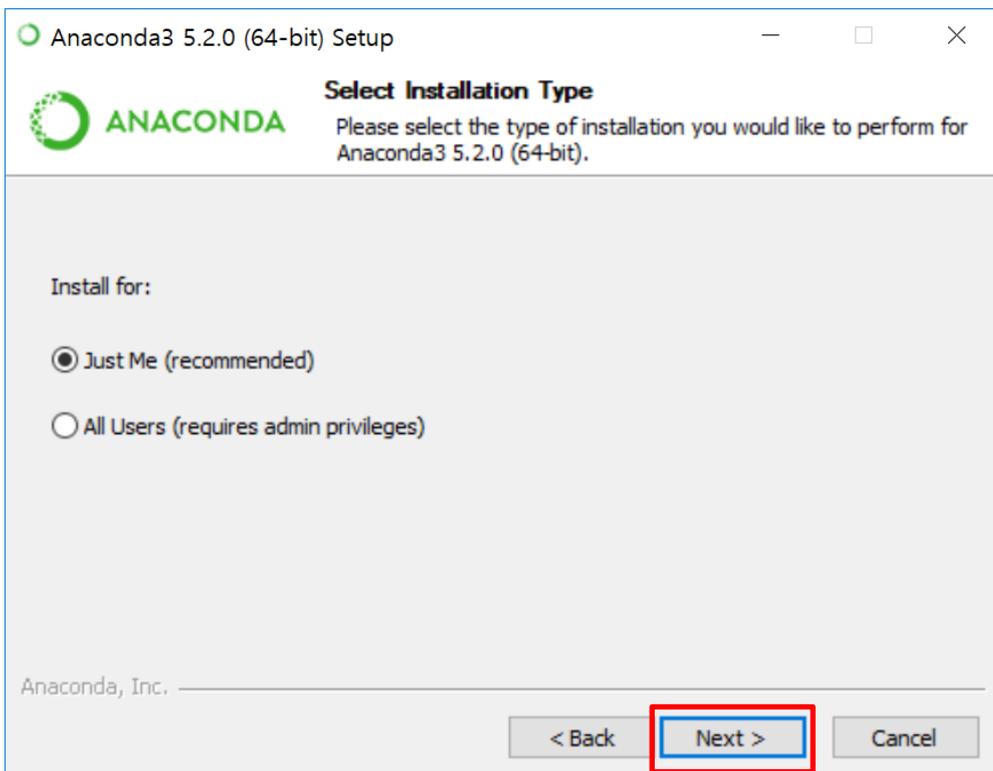
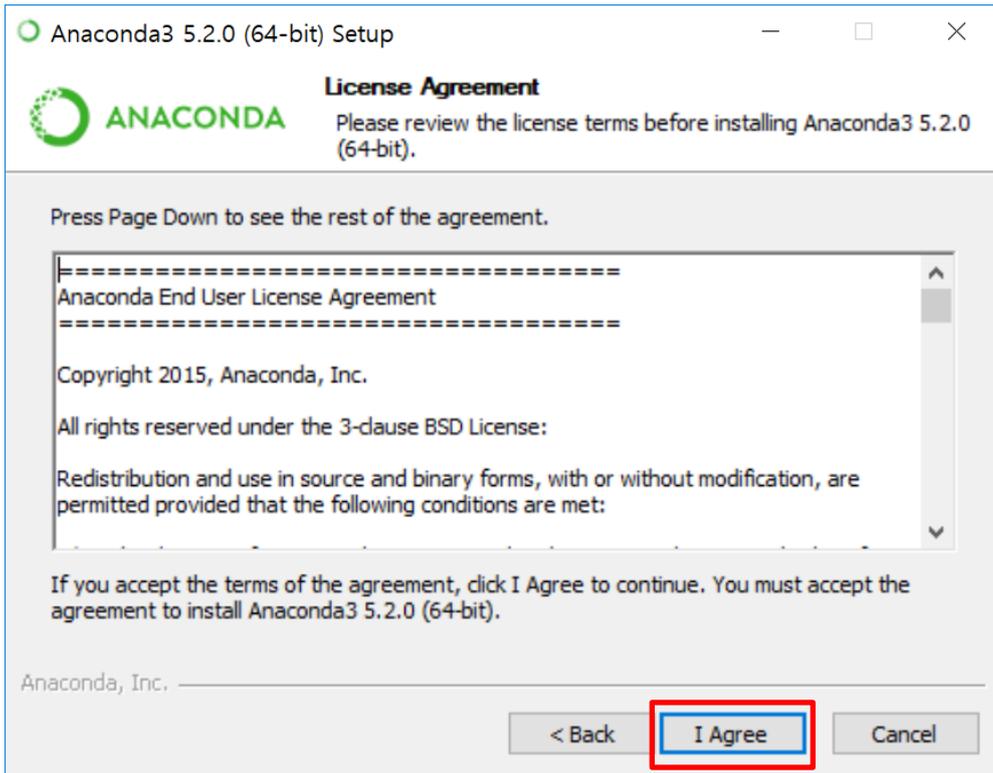
1. 아나콘다 설치

<https://www.anaconda.com/download/> 사이트로 이동

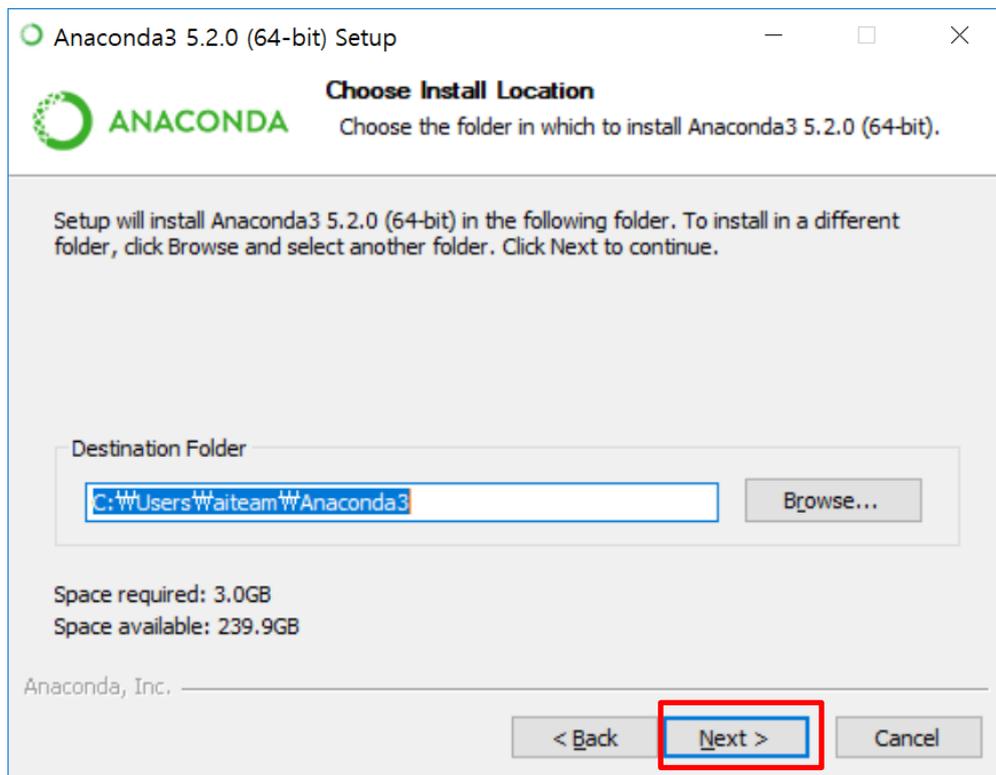


다운로드 파일 실행



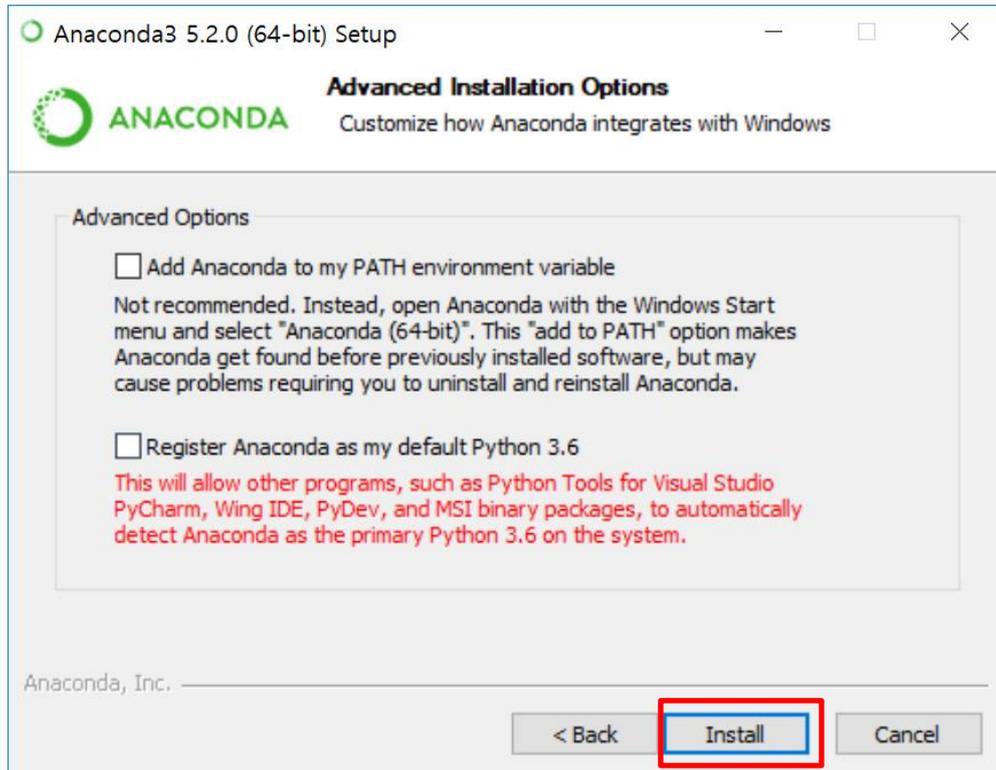


경로를 바꿀 필요가 있다면 바꿔준다.

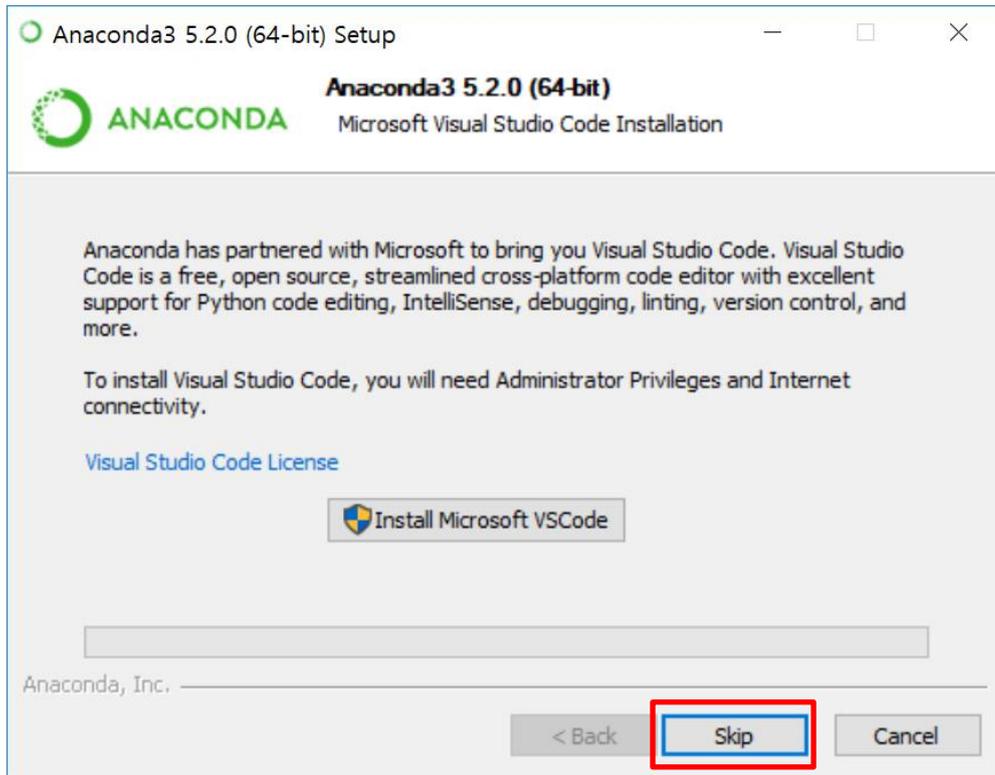


Add Anaconda to my PATH environment variable : 아나콘다를 PATH에 추가하는 옵션으로 권장되지 않는다.

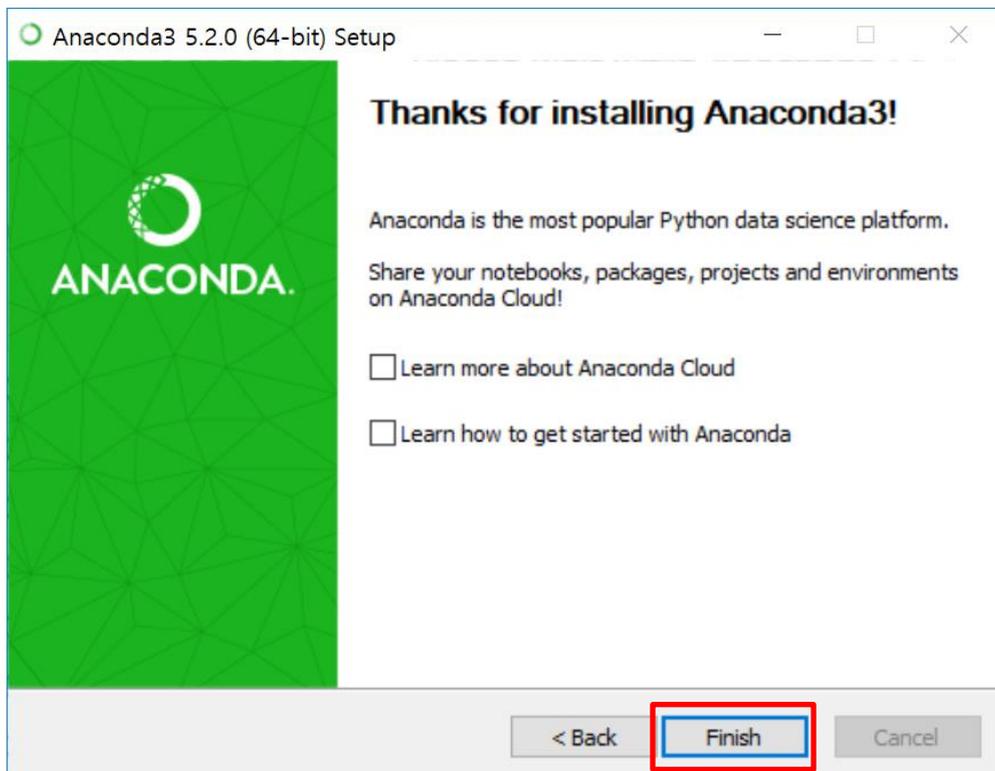
Register Anaconda as my default Python 3.6 : 타 프로그램에서 아나콘다에 설치된 python 3.6 버전을 자동으로 탐색하도록 설정하는 옵션



Microsoft VSCode를 설치하는지 물어보는 화면이다. 필요 없으니 skip

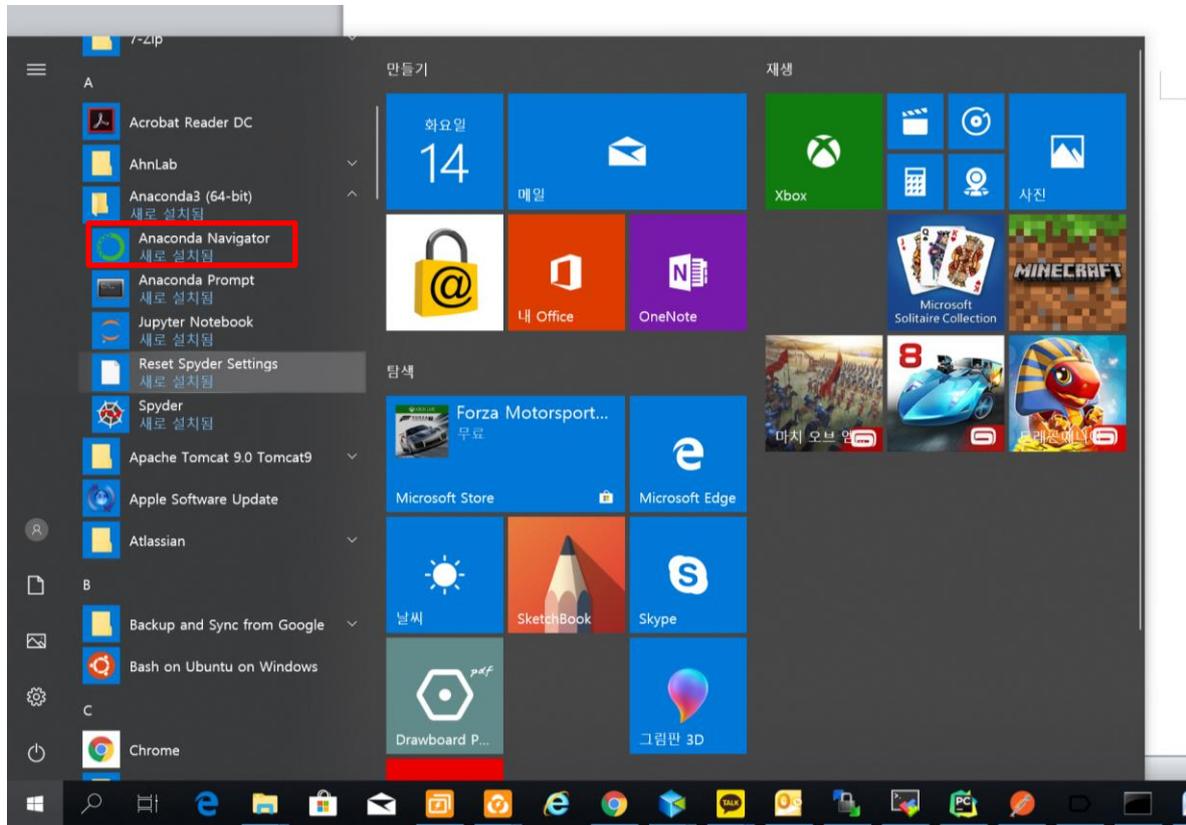


완료

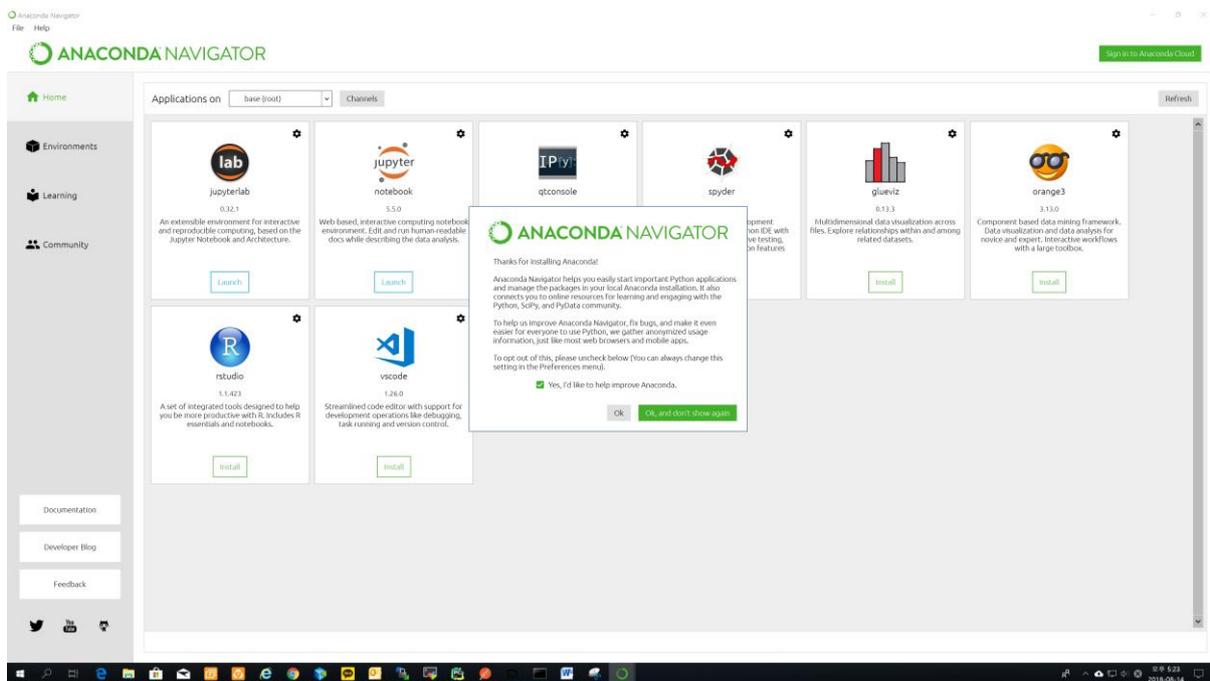


Anaconda3 이 새로 설치된 것을 확인할 수 있다.

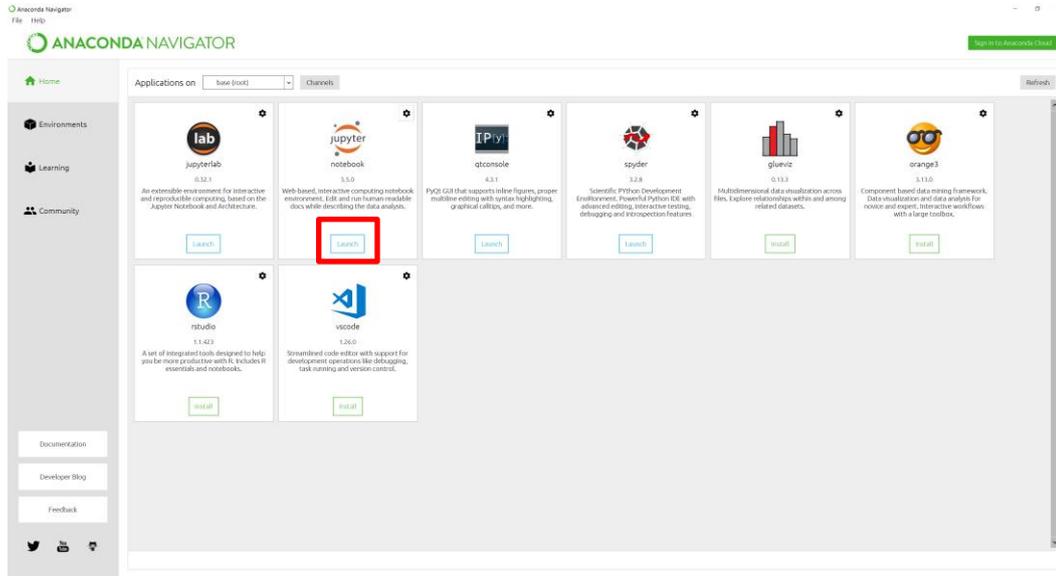
Anaconda Navigator 를 실행한다.



실행하면 생각보다 화면이 뜨는데 오래 걸린다. 기다린다.

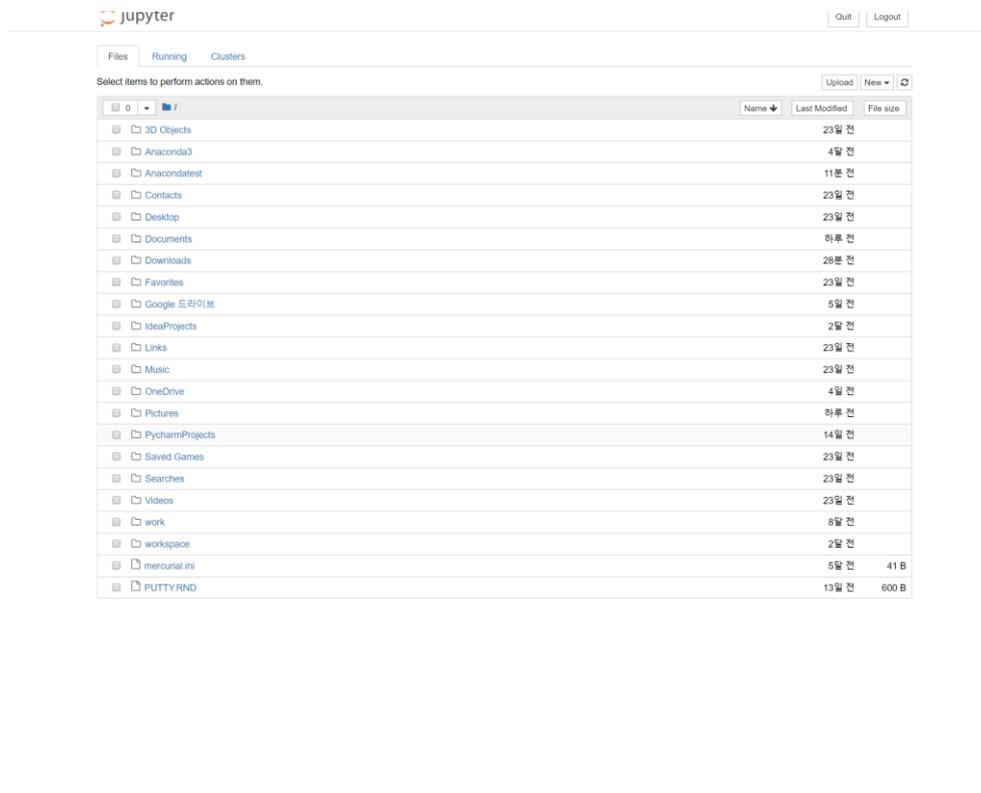


Jupyter notebook을 실행해 본다.



웹 브라우저에서 아래와 같이 화면이 열린다.

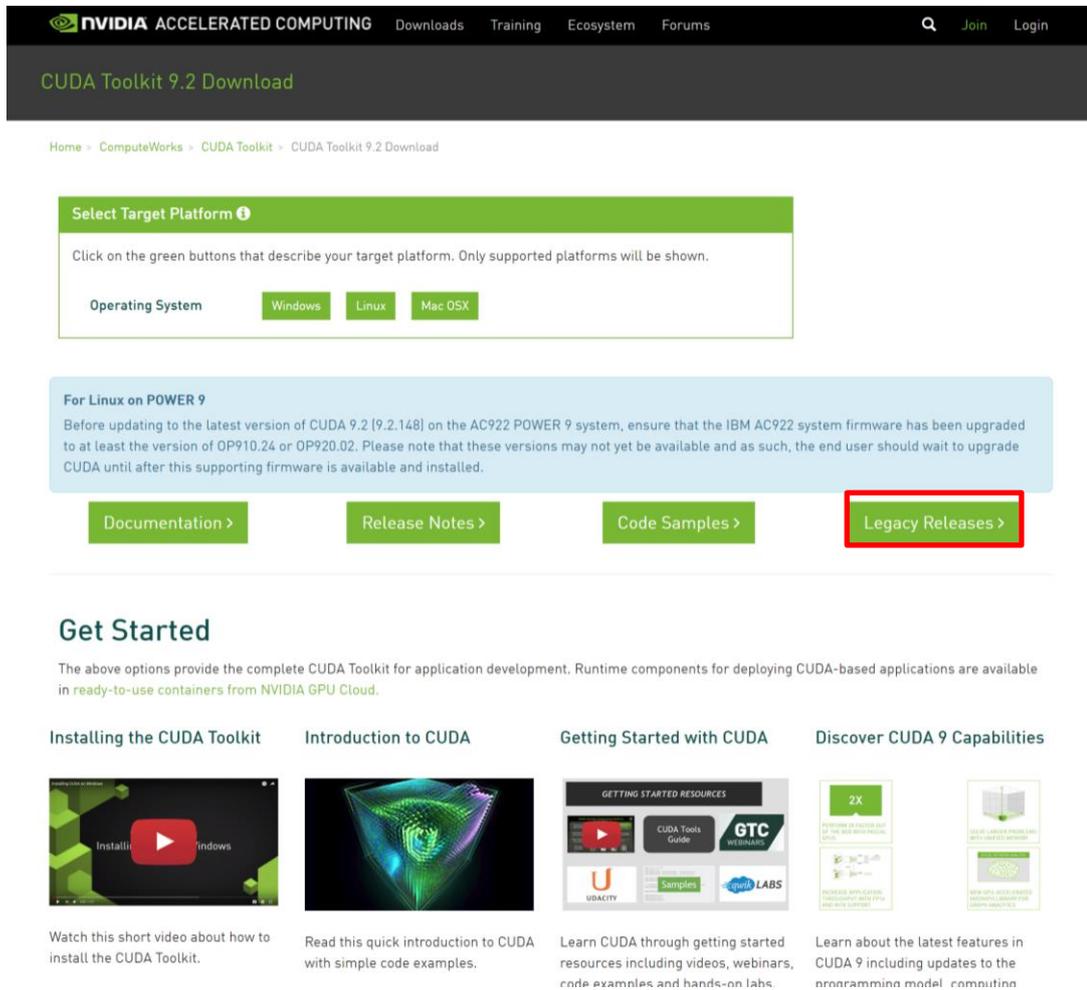
Anaconda 설치 완료



2. CUDA Toolkit 설치

<https://developer.nvidia.com/cuda-downloads> 접속

2018. 08. 14 기준으로 최신버전은 9.2이다. Legacy Releases를 선택



NVIDIA ACCELERATED COMPUTING Downloads Training Ecosystem Forums Join Login

CUDA Toolkit 9.2 Download

Home > ComputeWorks > CUDA Toolkit > CUDA Toolkit 9.2 Download

Select Target Platform

Click on the green buttons that describe your target platform. Only supported platforms will be shown.

Operating System Windows Linux Mac OSX

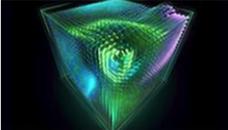
For Linux on POWER 9

Before updating to the latest version of CUDA 9.2 (9.2.148) on the AC922 POWER 9 system, ensure that the IBM AC922 system firmware has been upgraded to at least the version of OP910.24 or OP920.02. Please note that these versions may not yet be available and as such, the end user should wait to upgrade CUDA until after this supporting firmware is available and installed.

[Documentation >](#) [Release Notes >](#) [Code Samples >](#) [Legacy Releases >](#)

Get Started

The above options provide the complete CUDA Toolkit for application development. Runtime components for deploying CUDA-based applications are available in [ready-to-use containers from NVIDIA GPU Cloud](#).

Installing the CUDA Toolkit	Introduction to CUDA	Getting Started with CUDA	Discover CUDA 9 Capabilities
			
Watch this short video about how to install the CUDA Toolkit.	Read this quick introduction to CUDA with simple code examples.	Learn CUDA through getting started resources including videos, webinars, code examples, and hands-on labs.	Learn about the latest features in CUDA 9 including updates to the programming model, computing

가장 오랫동안 사용되어 온 8.0 GA1 버전을 설치한다.

NVIDIA ACCELERATED COMPUTING Downloads Training Ecosystem Forums Join Login

CUDA Toolkit Archive

Home > ComputeWorks > CUDA Toolkit > CUDA Toolkit Archive

Previous releases of the CUDA Toolkit, GPU Computing SDK, documentation and developer drivers can be found using the links below. Please select the release you want from the list below, and be sure to check www.nvidia.com/drivers for more recent production drivers appropriate for your hardware configuration.

[Download CUDA Toolkit 9.2](#) [Learn More about CUDA Toolkit 9](#)

Latest Release
CUDA Toolkit 9.2 (March 2018)

Archived Releases

- [CUDA Toolkit 9.1 \(Dec 2017\), Online Documentation](#)
- [CUDA Toolkit 9.0 \(Sept 2017\), Online Documentation](#)
- [CUDA Toolkit 8.0 GA2 \(Feb 2017\), Online Documentation](#)
- [CUDA Toolkit 8.0 GA1 \(Sept 2016\), Online Documentation](#)**
- [CUDA Toolkit 7.5 \(Sept 2015\)](#)
- [CUDA Toolkit 7.0 \(March 2015\)](#)
- [CUDA Toolkit 6.5 \(August 2014\)](#)
- [CUDA Toolkit 6.0 \(April 2014\)](#)
- [CUDA Toolkit 5.5 \(July 2013\)](#)
- [CUDA Toolkit 5.0 \(Oct 2012\)](#)
- [CUDA Toolkit 4.2 \(April 2012\)](#)
- [CUDA Toolkit 4.1 \(Jan 2012\)](#)
- [CUDA Toolkit 4.0 \(May 2011\)](#)
- [CUDA Toolkit 3.2 \(Nov 2010\)](#)
- [CUDA Toolkit 3.1 \(June 2010\)](#)
- [CUDA Toolkit 3.0 \(March 2010\)](#)
- [OpenCL 1.0 Release \(Sept 2009\)](#)
- [CUDA Toolkit 2.3 \(June 2009\)](#)
- [CUDA Toolkit 2.2 \(May 2009\)](#)
- [CUDA Toolkit 2.1 \(Jan 2009\)](#)
- [CUDA Toolkit 2.0 \(Aug 2008\)](#)
- [CUDA Toolkit 1.1 \(Dec 2007\)](#)
- [CUDA Toolkit 1.0 \(June 2007\)](#)

[Learn more about the latest CUDA Toolkit and the CUDA Tools and Library Ecosystem](#)

QUICKLINKS

- [Accelerated Computing - Training](#)
- [CUDA GPUs](#)
- [Tools & Ecosystem](#)
- [OpenACC: More Science Less Programming](#)
- [CUDA FAQ](#)

GPU Computing [Follow](#)

NVIDIA HPC Developer @NVIDIAHPCDev

Announcing #CUDA 10, the latest software development platform for building #GPU-accelerated applications, with support for #Turing GPUs, performance optimized libraries, and more. #SIGGRAPH2018 nvidia.ws/2OvnhHQ



순서대로 선택하고 파일을 다운로드 받는다.

NVIDIA ACCELERATED COMPUTING Downloads Training Ecosystem Forums Q Join Login

CUDA Toolkit 8.0 GA1 Download

Home > ComputeWorks > CUDA Toolkit > CUDA Toolkit Archive > CUDA Toolkit 8.0 GA1 Download

Select Target Platform

Click on the green buttons that describe your target platform. Only supported platforms will be shown.

Operating System Windows Linux Mac OSX

Architecture x86_64

Version 10 8.1 7 Server 2012 R2
Server 2008 R2

Installer Type exe (network) exe (local)

Download Installer for Windows 10 x86_64

The base installer is available for download below.

Base Installer Download [1.2 GB]

Installation Instructions:

1. Double click cuda_8.0.44_win10.exe
2. Follow on-screen prompts

The checksums for the installer and patches can be found in [Installer Checksums](#).

For further information, see the [Installation Guide for Microsoft Windows](#) and the [CUDA Quick Start Guide](#).

Related Links

- CUDA Quick Start Guide
- Release Notes
- EULA
- Online Documentation
- CUDA Toolkit Overview
- Installer Checksums
- Open Source Packages
- Legacy CUDA Toolkits

QUICKLINKS

- Accelerated Computing - Training
- CUDA GPUs
- Tools & Ecosystem
- OpenACC: More Science Less Programming
- CUDA FAQ

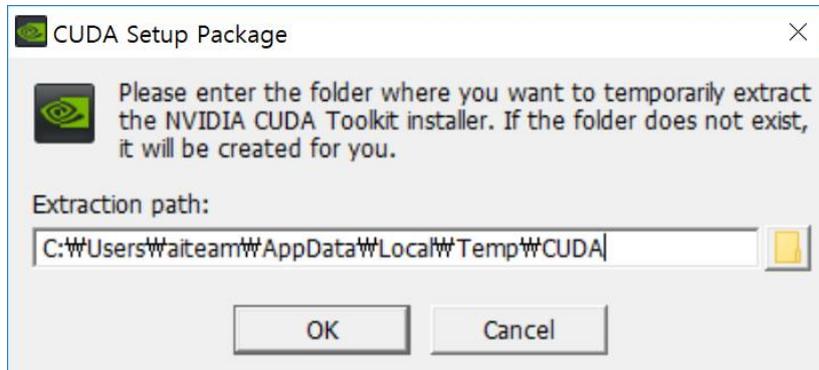
GPU Computing

NVIDIA HPC Developer @NVIDIAHPCDev
Announcing #CUDA 10, the latest software development platform for building #GPU-accelerated applications, with support for #Turing GPUs, performance optimized libraries, and more. #SIGGRAPH2018 [nvida.ws/2OvnhHQ](https://nvidia.ws/2OvnhHQ)

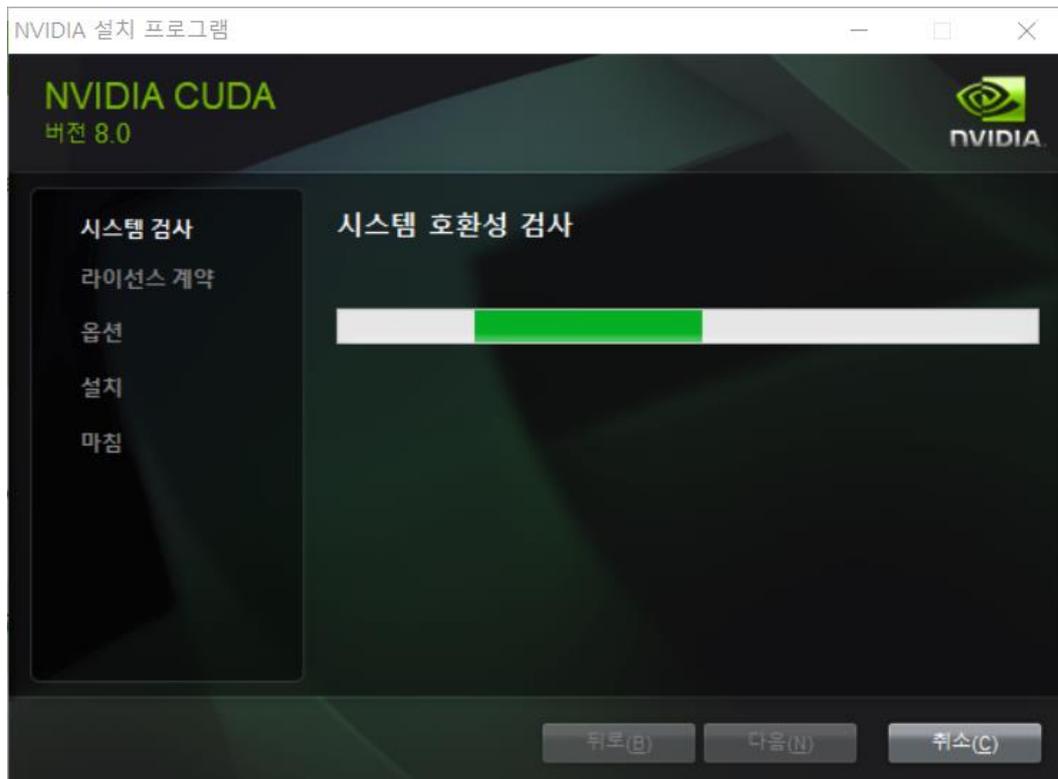
ANNOUNCING CUDA 10

다운로드 받은 설치 파일을 실행한다.

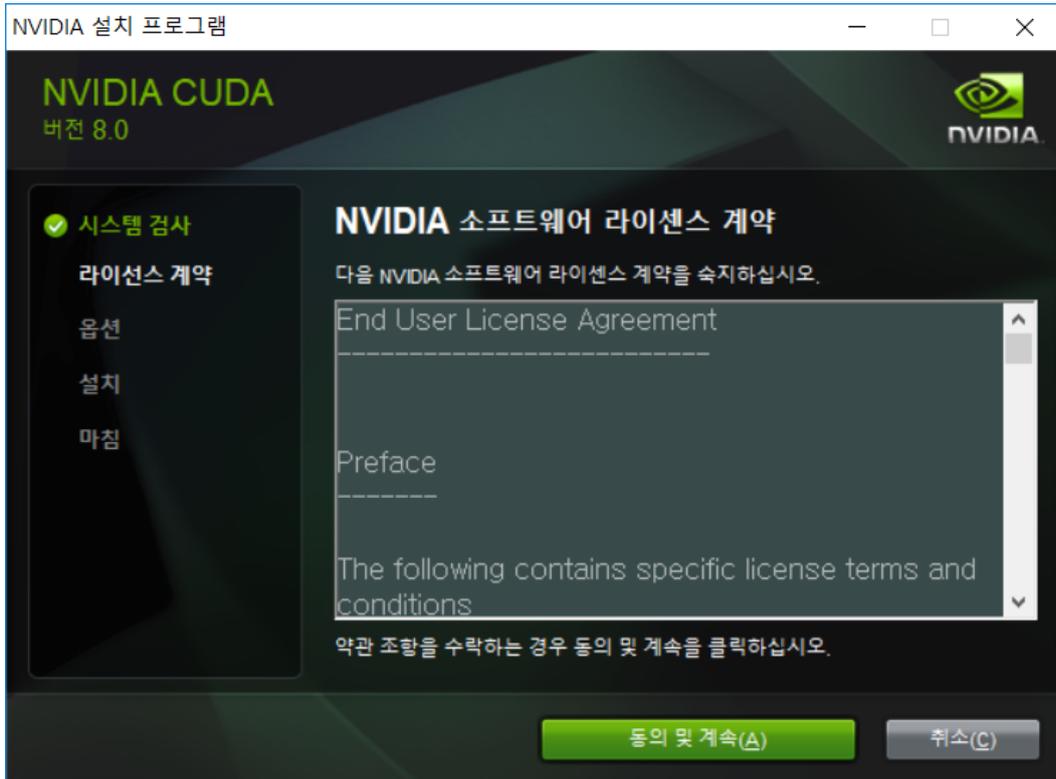
임시 압축 해제 경로이니 OK



호환성 검사가 진행된다



동의하고 계속 진행



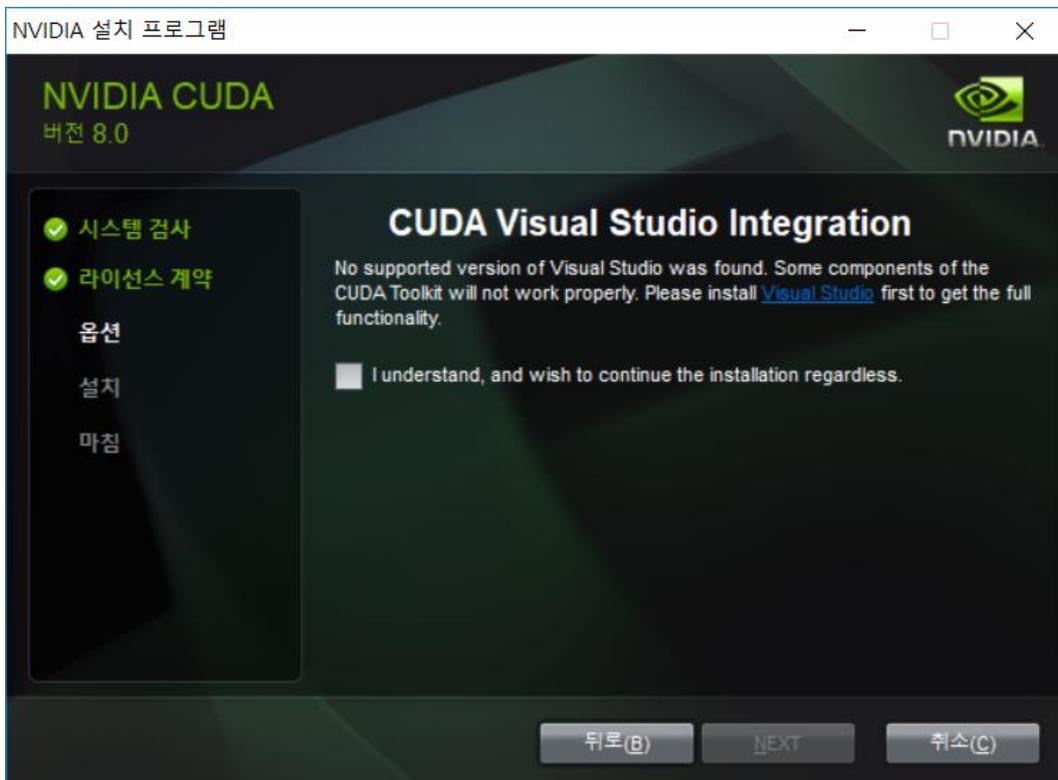
설치 되어 있는 드라이버가 다운그레이드 될 수 있기 때문에 사용자 정의 설치로 진행한다.



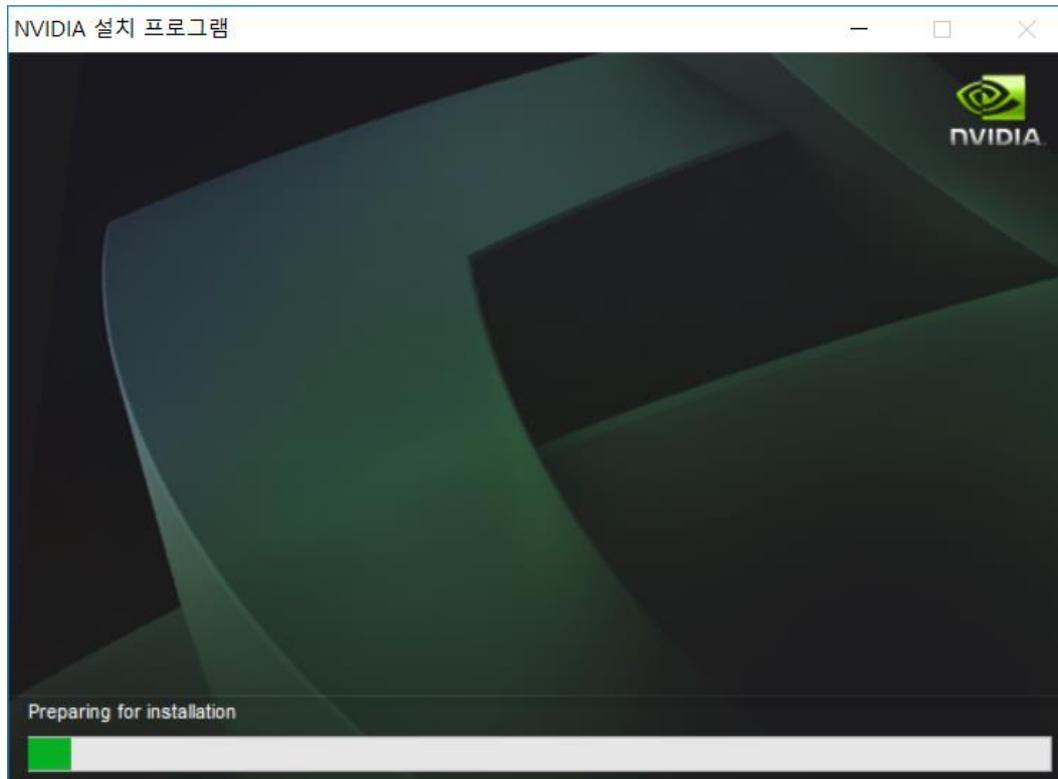
새 버전이 현재 버전보다 낮다면 설치 항목에서 제외하고 CUDA 만 설치하도록 한다.



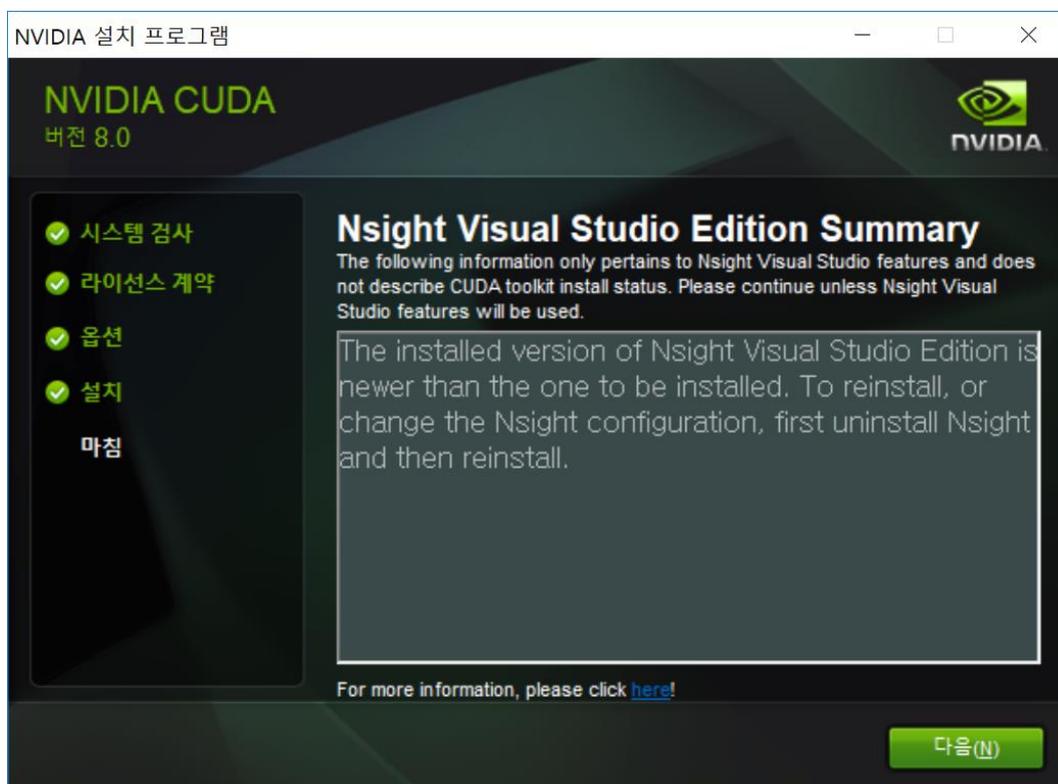
CUDA 가 지원되는 Visual Studio 가 없다면 알림 메시지가 출력된다. 체크하고 다음



설치가 진행된다. 꽤 시간이 걸린다.



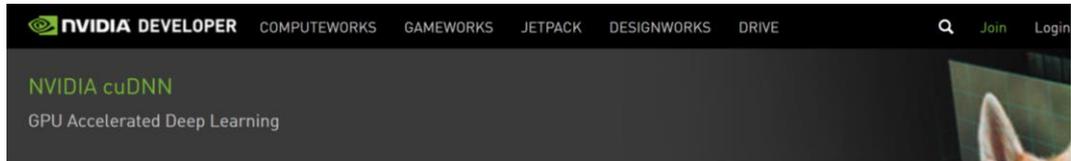
Cuda toolkit 설치가 완료 되었다.



3. GPU 사용을 위한 CUDNN 설치

Note : 해당 과정은 GPU 를 사용하지 않는 사용자는 건너뛰도록 합니다.

<https://developer.nvidia.com/cudnn> 접속한다.



[Home](#) > [Deep Learning](#) > [Software](#) > NVIDIA cuDNN

The NVIDIA CUDA® Deep Neural Network library (cuDNN) is a GPU-accelerated library of primitives for **deep neural networks**. cuDNN provides highly tuned implementations for standard routines such as forward and backward convolution, pooling, normalization, and activation layers. cuDNN is part of the **NVIDIA Deep Learning SDK**.

Deep learning researchers and framework developers worldwide rely on cuDNN for high-performance GPU acceleration. It allows them to focus on training neural networks and developing software applications rather than spending time on low-level GPU performance tuning. cuDNN accelerates widely used deep learning frameworks, including **Caffe2**, **MATLAB**, **Microsoft Cognitive Toolkit**, **TensorFlow**, **Theano**, and **PyTorch**. For access to NVIDIA optimized deep learning framework containers, visit **NVIDIA GPU CLOUD** to learn more and get started.

[Download cuDNN >](#)

[Introductory Webinar >](#)

[Developer Guide >](#)

[Forums >](#)

What's New in cuDNN 7.2?

Deep learning frameworks using cuDNN 7 and later, can leverage new features and performance of the Volta architecture to deliver up to 6x faster training performance compared to Pascal GPUs. cuDNN 7.2 highlights include:

- TensorCore acceleration with FP32 inputs and outputs (previously restricted to FP16 input)
- RNN cells now support more use cases with options for cell clipping and padding masks
- Automatically select the best RNN implementation with RNN search API

Read the latest [cuDNN release notes](#) for a detailed list of new features and enhancements.



CUDNN 은 가입과 로그인이 필요하다. 구글 계정으로 간단하게 사용할 수 있다.



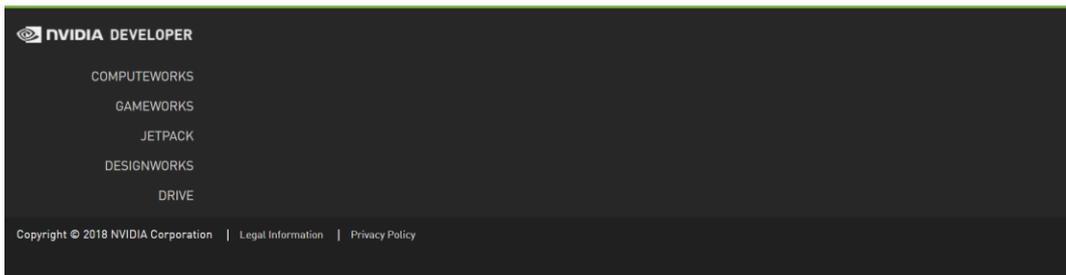
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로그인이 되면 라이선스 정책에 동의한다.

앞서 설치한 CUDA Toolkit 버전에 해당하는 cuDNN 을 찾으려 한다.

Archived cuDNN Releases 를 선택하면 리스트가 확장된다.



[Home](#) > [Deep Learning](#) > [Software](#) > [cuDNN Download](#)

cuDNN Download

NVIDIA cuDNN is a GPU-accelerated library of primitives for deep neural networks.

[I Agree To the Terms of the cuDNN Software License Agreement](#)

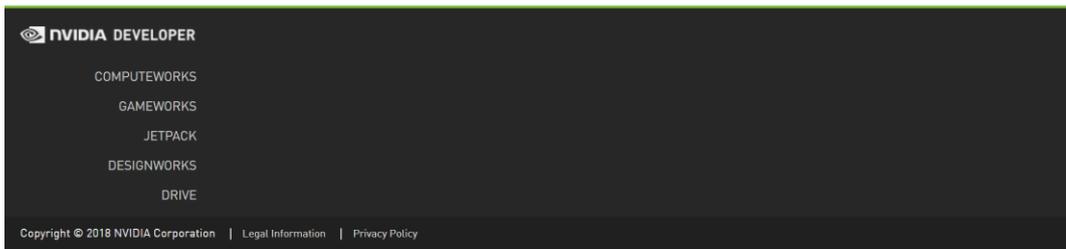
Note: Please refer to the [Installation Guide](#) for release prerequisites, including supported GPU architectures and compute capabilities, before downloading. For more information, refer to the cuDNN Developer Guide, Installation Guide and Release Notes on the [Deep Learning SDK Documentation](#) web page.

[Download cuDNN v7.2.1 \[August 7, 2018\], for CUDA 9.2](#)

[Download cuDNN v7.2.1 \[August 7, 2018\], for CUDA 9.0](#)

[Download cuDNN v7.2.1 \[August 7, 2018\], for CUDA 8.0](#)

[Archived cuDNN Releases](#)



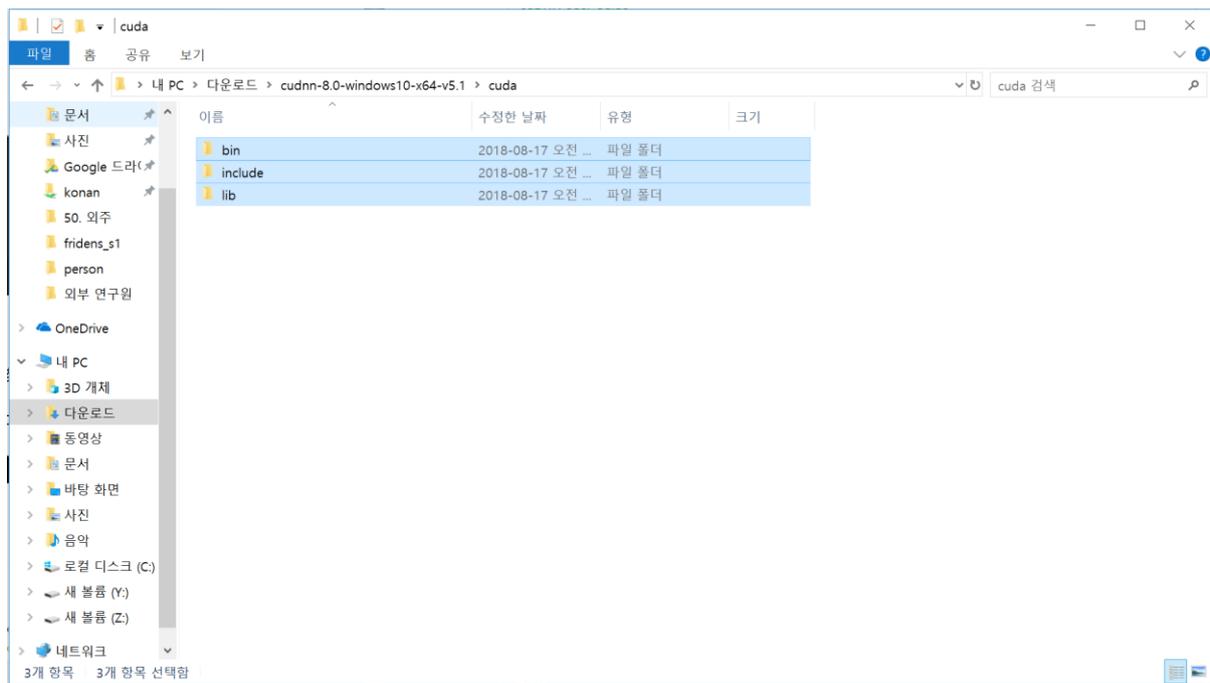
확장된 리스트에서 아래 항목을 찾아서 윈도우 10 버전을 다운로드 받는다.

Download cuDNN v6.0 (April 27, 2017), for CUDA 8.0

Download packages updated April 27, 2017 to resolve issues related to dilated convolution on Kepler Architecture GPUs.

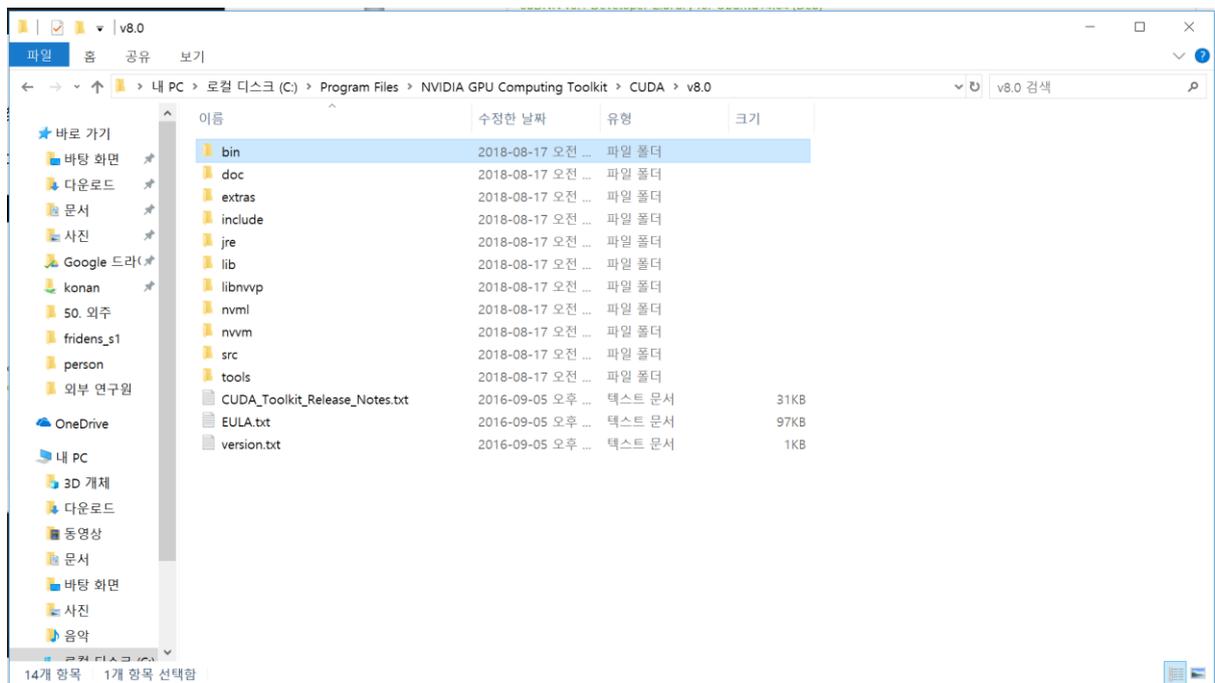
- [cuDNN User Guide](#)
- [cuDNN Install Guide](#)
- [cuDNN v6.0 Library for Linux](#)
- [cuDNN v6.0 Library for Power8](#)
- [cuDNN v6.0 Library for Windows 7](#)
- [cuDNN v6.0 Library for Windows 10](#)
- [cuDNN v6.0 Library for OSX](#)
- [cuDNN v6.0 Release Notes](#)
- [cuDNN v6.0 Runtime Library for Ubuntu16.04 \(Deb\)](#)
- [cuDNN v6.0 Developer Library for Ubuntu16.04 \(Deb\)](#)
- [cuDNN v6.0 Code Samples and User Guide for Ubuntu16.04 \(Deb\)](#)
- [cuDNN v6.0 Runtime Library for Ubuntu14.04 \(Deb\)](#)
- [cuDNN v6.0 Developer Library for Ubuntu14.04 \(Deb\)](#)
- [cuDNN v6.0 Code Samples and User Guide for Ubuntu14.04 \(Deb\)](#)
- [cuDNN v6.0 Runtime Library for Ubuntu16.04 Power8 \(Deb\)](#)
- [cuDNN v6.0 Developer Library for Ubuntu16.04 Power8 \(Deb\)](#)
- [cuDNN v6.0 Code Samples and User Guide Power8 \(Deb\)](#)

압축 해제 후 폴더에 들어가면 cuda 라는 폴더가 있다. Cuda 폴더에 들어간 후 3 개의 폴더를 Ctrl + c 로 폴더 복사



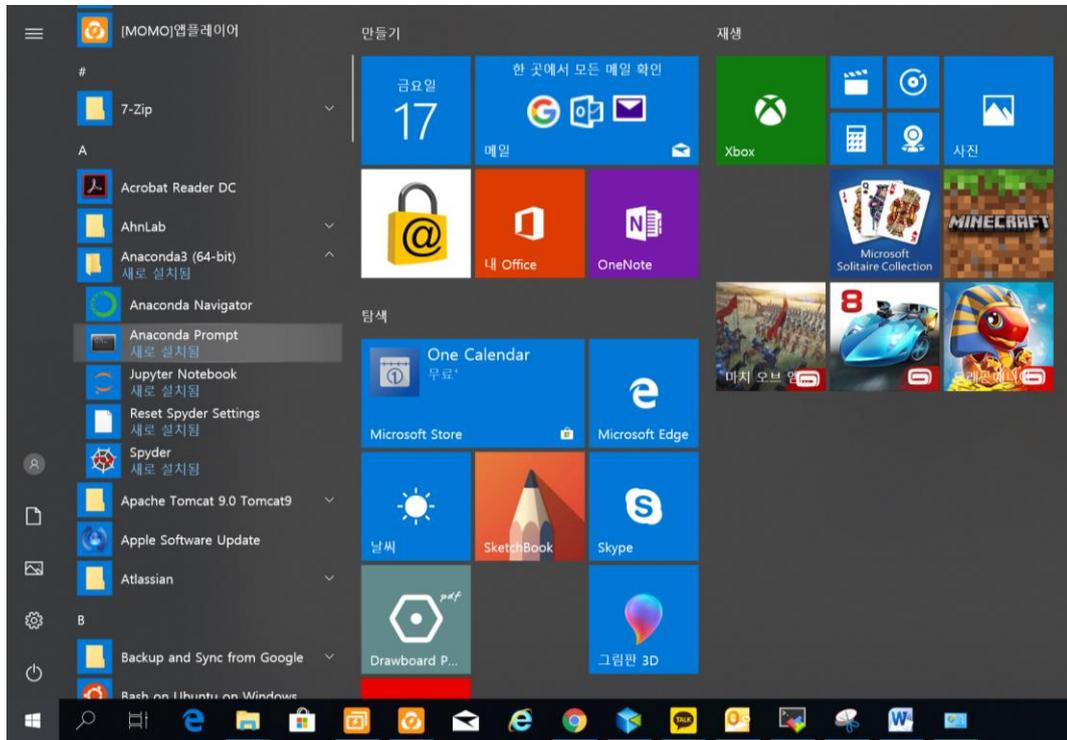
C:\Program Files\NVIDIA GPU Computing Toolkit\CUDA\v8.0 로 이동하여 Ctrl + v 로 붙여넣기를 해서 cuDNN 을 CUDA Toolkit 에서 사용할 수 있도록 만들어 준다.

cuDNN 도 설치 완료.



4. Tensorflow 설치

처음 설치한 Anaconda 에서 prompt 를 실행한다.



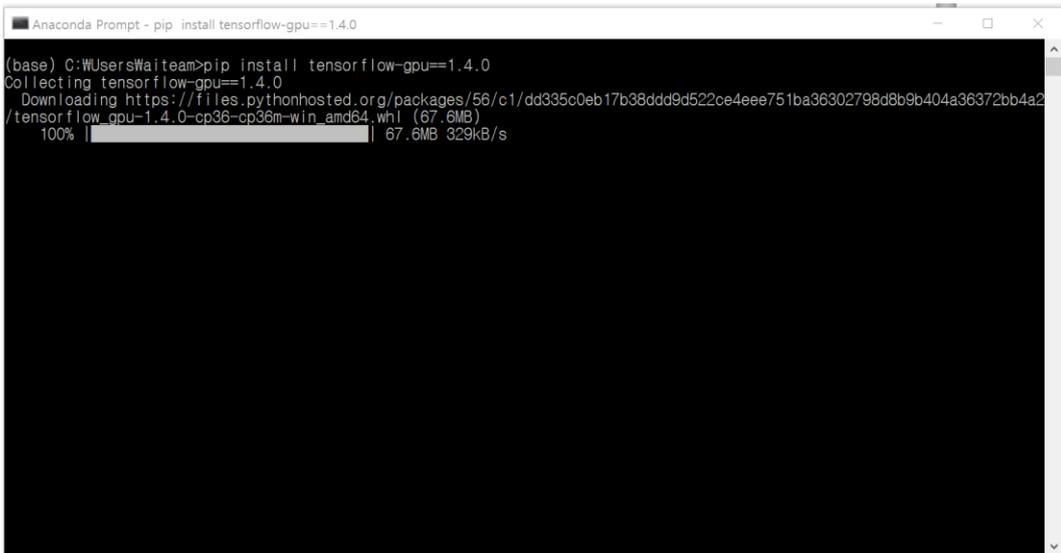
윈도우 커맨드 창과 비슷한 화면이 출력된다

GPU 를 사용하는 경우

Pip install tensorflow-gpu==1.4.0 이라고 입력한다.

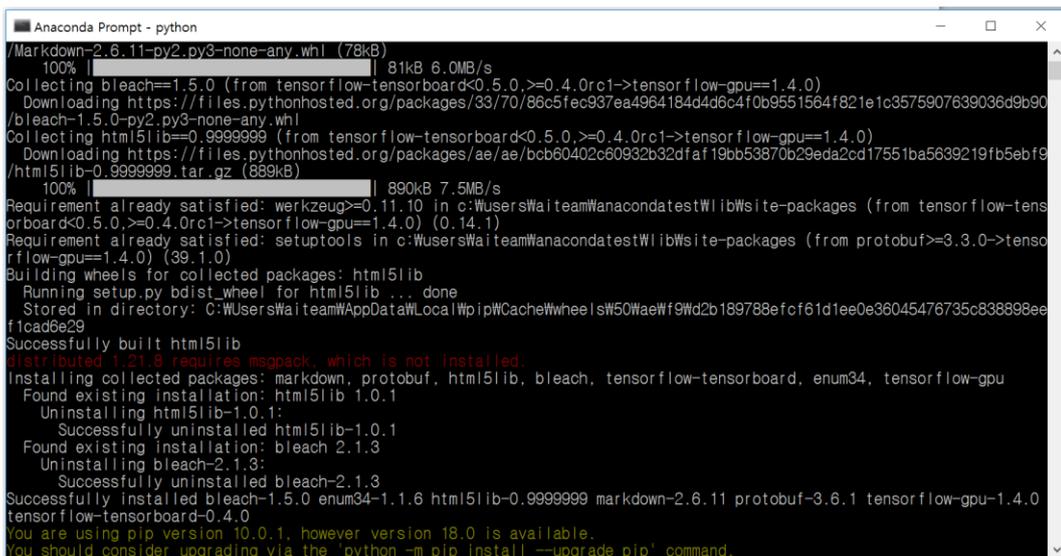
GPU 를 사용하지 않는 경우

Pip install tensorflow==1.4.0



```
Anaconda Prompt - pip install tensorflow-gpu==1.4.0
(base) C:\Users\Waiteam>pip install tensorflow-gpu==1.4.0
Collecting tensorflow-gpu==1.4.0
  Downloading https://files.pythonhosted.org/packages/56/c1/dd33c0eb17b38dd9d522ce4eee751ba36302798d8b9b404a36372bb4a2
/tensorflow_gpu-1.4.0-cp36-cp36m-win_amd64.whl (67.6MB)
    100% |#####| 67.6MB 329kB/s
Collecting bleach==1.5.0 (from tensorflow-tensorboard<0.5.0,>=0.4.0rc1->tensorflow-gpu==1.4.0)
  Downloading https://files.pythonhosted.org/packages/33/70/86c5fec937ea4964184d4d6c4f0b9551564f821e1c3575907639036d9b90
/bleach-1.5.0-py2.py3-none-any.whl
Collecting html5lib==0.999999 (from tensorflow-tensorboard<0.5.0,>=0.4.0rc1->tensorflow-gpu==1.4.0)
  Downloading https://files.pythonhosted.org/packages/ae/ae/bcb60402c60932b32dfaf19bb53870b29eda2cd17551ba5639219fb5ebf9
/html5lib-0.999999.tar.gz (889kB)
    100% |#####| 890kB 7.5MB/s
Requirement already satisfied: werkzeug>=0.11.10 in c:\Users\Waiteam\Anaconda\test\Wlib\site-packages (from tensorflow-tens
orboard<0.5.0,>=0.4.0rc1->tensorflow-gpu==1.4.0) (0.14.1)
Requirement already satisfied: setuptools in c:\Users\Waiteam\Anaconda\test\Wlib\site-packages (from protobuf>=3.3.0->tens
orflow-gpu==1.4.0) (39.1.0)
Building wheels for collected packages: html5lib
  Running setup.py bdist_wheel for html5lib ... done
  Stored in directory: C:\Users\Waiteam\AppData\Local\pip\Cache\wheels\50\ae\ff9\Wd2b189788efcf61d1ee0e36045476735c838898ee
f1cad6e29
Successfully built html5lib
distributed 1.21.3 requires msgpack, which is not installed.
Installing collected packages: markdown, protobuf, html5lib, bleach, tensorflow-tensorboard, enum34, tensorflow-gpu
  Found existing installation: html5lib 1.0.1
    Uninstalling html5lib-1.0.1:
      Successfully uninstalled html5lib-1.0.1
  Found existing installation: bleach 2.1.3
    Uninstalling bleach-2.1.3:
      Successfully uninstalled bleach-2.1.3
Successfully installed bleach-1.5.0 enum34-1.1.6 html5lib-0.999999 markdown-2.6.11 protobuf-3.6.1 tensorflow-gpu-1.4.0
tensorflow-tensorboard-0.4.0
You are using pip version 10.0.1, however version 18.0 is available.
You should consider upgrading via the 'python -m pip install --upgrade pip' command.
```

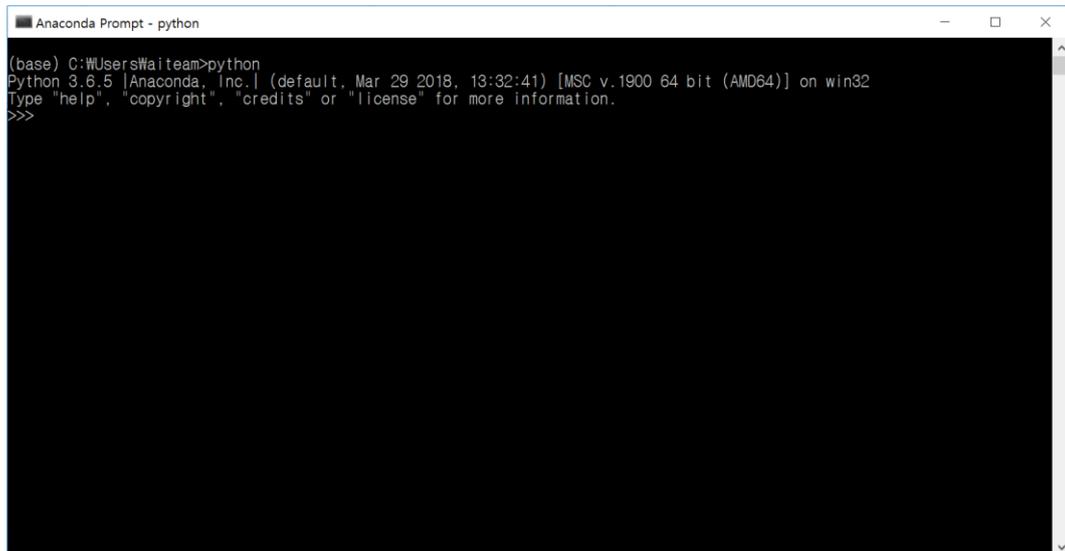
설치가 빠르게 진행된다



```
Anaconda Prompt - python
/Markdown-2.6.11-py2.py3-none-any.whl (78kB)
    100% |#####| 81kB 6.0MB/s
Collecting bleach==1.5.0 (from tensorflow-tensorboard<0.5.0,>=0.4.0rc1->tensorflow-gpu==1.4.0)
  Downloading https://files.pythonhosted.org/packages/33/70/86c5fec937ea4964184d4d6c4f0b9551564f821e1c3575907639036d9b90
/bleach-1.5.0-py2.py3-none-any.whl
Collecting html5lib==0.999999 (from tensorflow-tensorboard<0.5.0,>=0.4.0rc1->tensorflow-gpu==1.4.0)
  Downloading https://files.pythonhosted.org/packages/ae/ae/bcb60402c60932b32dfaf19bb53870b29eda2cd17551ba5639219fb5ebf9
/html5lib-0.999999.tar.gz (889kB)
    100% |#####| 890kB 7.5MB/s
Requirement already satisfied: werkzeug>=0.11.10 in c:\Users\Waiteam\Anaconda\test\Wlib\site-packages (from tensorflow-tens
orboard<0.5.0,>=0.4.0rc1->tensorflow-gpu==1.4.0) (0.14.1)
Requirement already satisfied: setuptools in c:\Users\Waiteam\Anaconda\test\Wlib\site-packages (from protobuf>=3.3.0->tens
orflow-gpu==1.4.0) (39.1.0)
Building wheels for collected packages: html5lib
  Running setup.py bdist_wheel for html5lib ... done
  Stored in directory: C:\Users\Waiteam\AppData\Local\pip\Cache\wheels\50\ae\ff9\Wd2b189788efcf61d1ee0e36045476735c838898ee
f1cad6e29
Successfully built html5lib
distributed 1.21.3 requires msgpack, which is not installed.
Installing collected packages: markdown, protobuf, html5lib, bleach, tensorflow-tensorboard, enum34, tensorflow-gpu
  Found existing installation: html5lib 1.0.1
    Uninstalling html5lib-1.0.1:
      Successfully uninstalled html5lib-1.0.1
  Found existing installation: bleach 2.1.3
    Uninstalling bleach-2.1.3:
      Successfully uninstalled bleach-2.1.3
Successfully installed bleach-1.5.0 enum34-1.1.6 html5lib-0.999999 markdown-2.6.11 protobuf-3.6.1 tensorflow-gpu-1.4.0
tensorflow-tensorboard-0.4.0
You are using pip version 10.0.1, however version 18.0 is available.
You should consider upgrading via the 'python -m pip install --upgrade pip' command.
```

python 으로 진입 해 본다

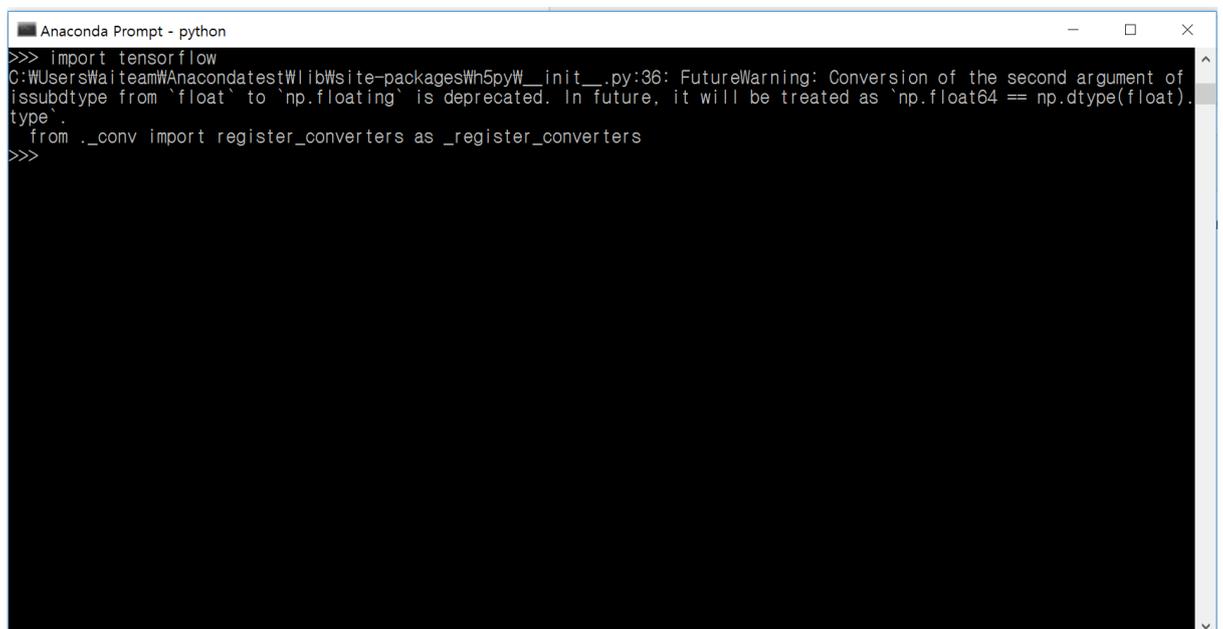
명령 프롬프트에서 python 을 입력



```
Anaconda Prompt - python
(base) C:\Users\Waiteam>python
Python 3.6.5 |Anaconda, Inc.| (default, Mar 29 2018, 13:32:41) [MSC v.1900 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
```

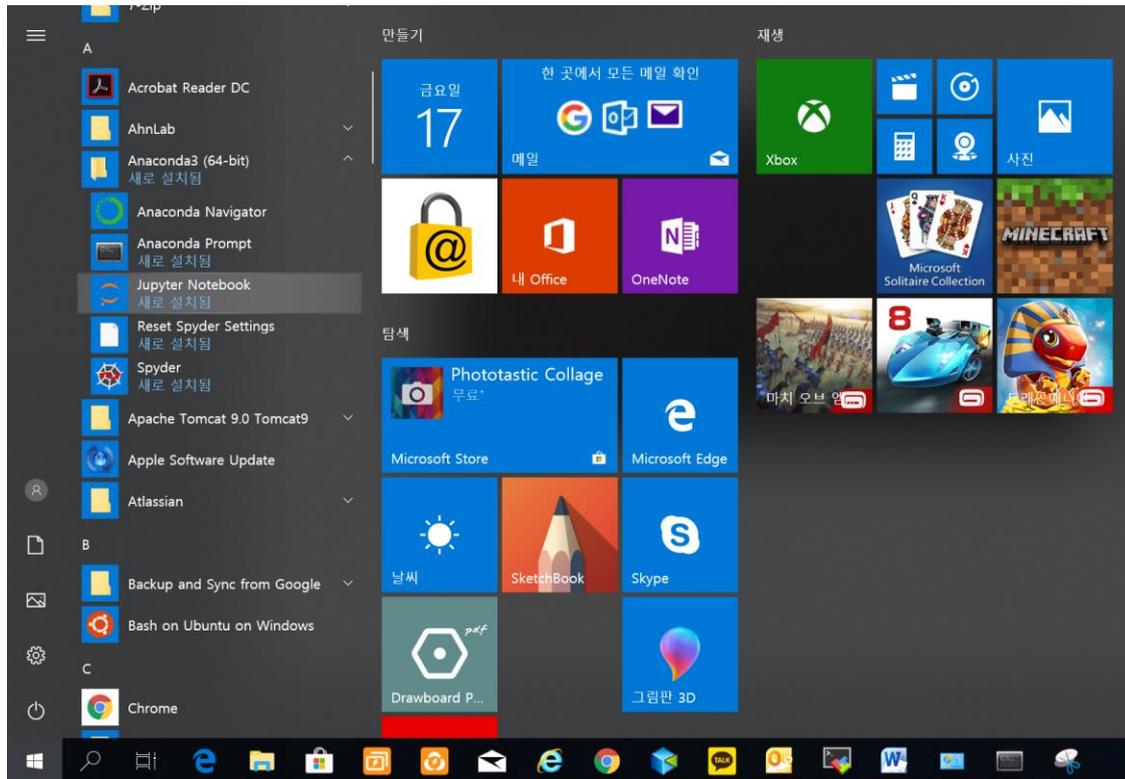
위와 같이 화면이 바뀐 상태에서

Import tensorflow 입력 했을 때 경고 메시지 외 에러 메시지가 없다면 CUDA-Toolkit, cuDNN, Tensorflow 1.4.0 이 모두 정상적으로 설치된 것이다.



```
Anaconda Prompt - python
>>> import tensorflow
C:\Users\Waiteam\Anaconda\test\lib\site-packages\Wh5pyW__init__.py:36: FutureWarning: Conversion of the second argument of
issubdtype from `float` to `np.floating` is deprecated. In future, it will be treated as `np.float64 == np.dtype(float).
type`.
  from ._conv import register_converters as _register_converters
>>>
```

예제 파일을 확인하기 위하여 jupyter notebook 을 실행한다.



예제파일 실행.

5. 요약

OS : 윈도우 10

Anaconda3 버전 : 5.2.0

python 버전 : 3.6.5

CUDA-Toolkit 버전 : 8.0 GA1

cuDNN 버전 : v6.0 for cuda 8.0

tensorflow(GPU) 버전 : 1.4.0