# Setup PhysiCell on Windows
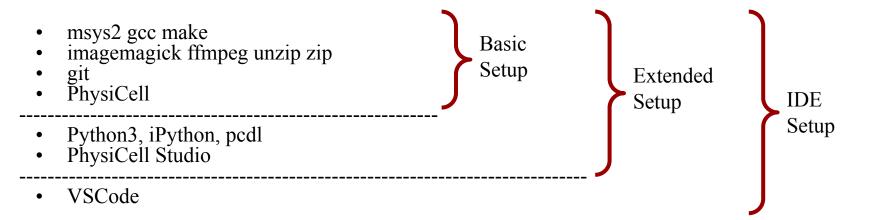
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# Overview

This document describes the PhysiCell installation on a Microsoft Windows machine.

- msys2 gcc make
- imagemagick ffmpeg unzip zip
- git
- PhysiCell

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- Python3, iPython, pcdl
- PhysiCell Studio

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- VSCode

Basic Setup

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# Msys2 part I (Basic Setup)

- Download and install msys2 x86_64.

  https://www.msys2.org/

- Open the MSYS2 MINGW64 shell.

  ```
  pacman -S mingw-w64-x86_64-gcc make

  pacman -S mingw-w64-x86_64-imagemagick mingw-w64-x86_64-ffmpeg

  pacman -S unzip zip

  pacman -S mingw-w64-x86_64-ca-certificates

  pacman -S git
  ```

- Additionally, we will generate a src folder in your Windows Home directory,
  where we later on will install PhysiCell and PhysiCell-Studio into it.
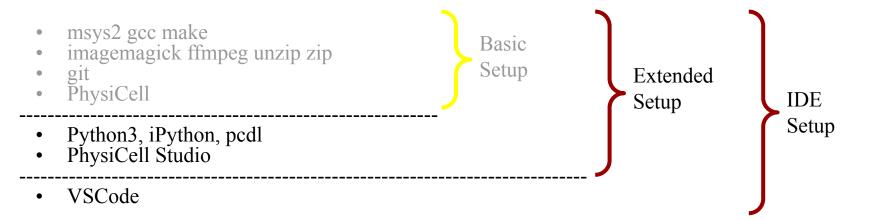
  ```
  mkdir -p /c/Users/$USER/src
  ```

# PhysiCell (Basic Setup)

- Open the msys2 MINGW64 shell, cd into the src directory and download PhysiCell.
  ```
  cd /c/Users/$USER/src
  git clone https://github.com/MathCancer/PhysiCell.git
  ```

- Test the installation with the template sample project.
  ```
  cd PhysiCell
  make data-cleanup clean reset
  make template
  make -j8
  ./project
  make jpeg
  make gif
  make movie
  ```

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# Python3 part I (Extended Setup)

We will **generate a python3 environment with the default Windows python installation**, where we will install all PhysiCell modelling related python libraries. We will name this Python3 environment **pcvenv** (PhysiCell virtual environment), and we install it in the **src** folder where just before have installed PhysiCell.
Here we demonstrate, how to generate the environment with the regular python. If you run mamba or conda, please adjust the commands accordingly.

- Open the **Windows PowerShell**!
  The first command will let you know if you have python installed. If not, then please go to the Microsoft Store and install the latest release available from the Python Software Foundation.

  ```
  Get-Command python.exe
  ```

  ```
  cd ~
  ```

  ```
  python.exe -m venv src/pcvenv
  ```

# Python3 part II (Extended Setup)

Now, **we link the python executable in this pcvenv as the default python installation for the msys2 shell**.

- Open the **msys2 MINGW64 shell** to generate an alias for this environment for activation:

```
echo "alias pcvenv=\"source /c/Users/$USER/src/pcvenv/Scripts/activate\"" >>
~/.bash_profile

source ~/.bash_profile

pcvenv  # activate the environment
```
which python # this should point to the python in the pcvenv/Scripts folder. if not, you made a mistake! please correct.

which pip # this should point to the python in the pcvenv/Scripts folder. if not, you made a mistake! please correct.

```
cd /c/Users/$USER/src/pcvenv/Scripts

ln -s python.exe python3.exe
```
which python3 # this should point to the python.exe file in the pcvenv/Scripts folder. if not, you made a mistake! please correct.

which pip3 # this should point to the python.exe file in the pcvenv/Scripts folder.

# Python3 part III (Extended Setup)

- Open the msys2 MINGW64 shell and
  activate the pcvenv python environment using the alias generated before:

  ```
  pcvenv
  ```

- Install the iPython shell:

  ```
  pip3 install ipython
  ```

- Install the PhysiCell Data Loader:

  ```
  pip3 install pcdl
  ```

# PhysiCell Studio part I (Extended Setup)

- Open the msys2 MINGW64 shell, cd into the src directory, download PhysiCell Studio and install its python3 dependencies.

```
cd /c/Users/$USER/src
```

```
git clone https://github.com/PhysiCell-Tools/PhysiCell-Studio.git
```

```
pip3 install -r PhysiCell-Studio/requirements.txt
```

- Put the studio under the `PATH`:

```
cd /c/Users/$USER/src/pcvenv/Scripts
```

```
echo "python3 /c/Users/$USER/src/PhysiCell-Studio/bin/studio.py \$*" >
pcstudio.exe
```

`which pcstudio`   #  this should point to the pcstudio.exe file in the Scripts folder.

# PhysiCell Studio part II (Extended Setup)

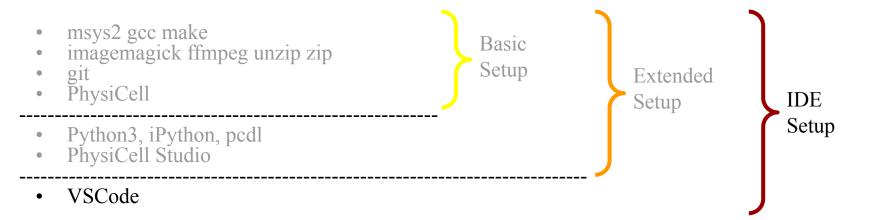- Test the installation with the template sample project:

```
cd /c/Users/$USER/src/PhysiCell
pcvenv
pcstudio
```

PhysiCell Studio should open and load the template PhysiCell_settings.xml file.

- Please check out the official PhysiCell Studio manual:

https://github.com/PhysiCell-Tools/Studio-Guide/tree/main

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# MS Visual Studio Code part I (IDE Setup)

1.  Install vs code, either from your operating system's app store or from https://code.visualstudio.com/

2.  Generate a vs code profile for physicell:

    ```
    File | New Window with Profile
    Name: physicell
    Icon: choose a cool one. e.g. 🔥.
    Create
    Add Folder: Home/src
    click the profile icon (default is a gearwheel) on the left side bottom corner.
    Profile > physicell
    ```

3.  Open the Folder:

    ```
    File | Open Folder… | src | Open
    Yes, I trust the authors
    ```

# MS Visual Studio Code part II (IDE Setup)

1. Install the official python and C++ extensions into the profile:

   ```
   click the profile icon (default is a gearwheel) on the left side bottom corner.

   Profile > physicell

   Extension: Python Install

   Extension: C/C++ Install
   ```

2. Link pcvenv (the python environment we generated above):

   ```
   View | Command Palette… | Python: Select Interpreter |
   Enter interpreter path… | Find… | src/pcvenv
   ```

# MS Visual Studio Code part III (IDE Setup)

1. Link msys2 MINGW64 as default shelll:

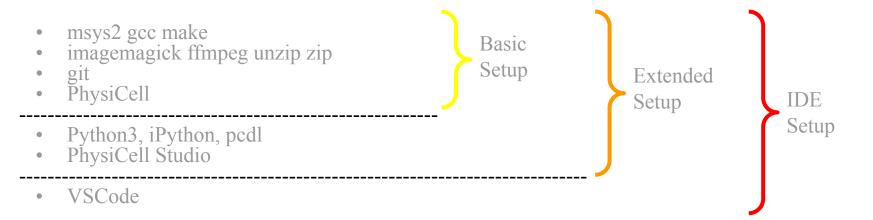   `View | Command Palette… | Preferences: Open Workspace Settings (JSON)`

   copy the **msys2 configuration json for visual studio code** (not sublime text!) found at
   https://www.msys2.org/docs/ides-editors/#visual-studio-code and pasted it into the vs code settings.json .

   `close the settings.json tab` # a dialog window will pop up.

   `click Save`

   `Terminal| New Terminal` # a msys2 shell integrated into the vs code IDE should open.

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