

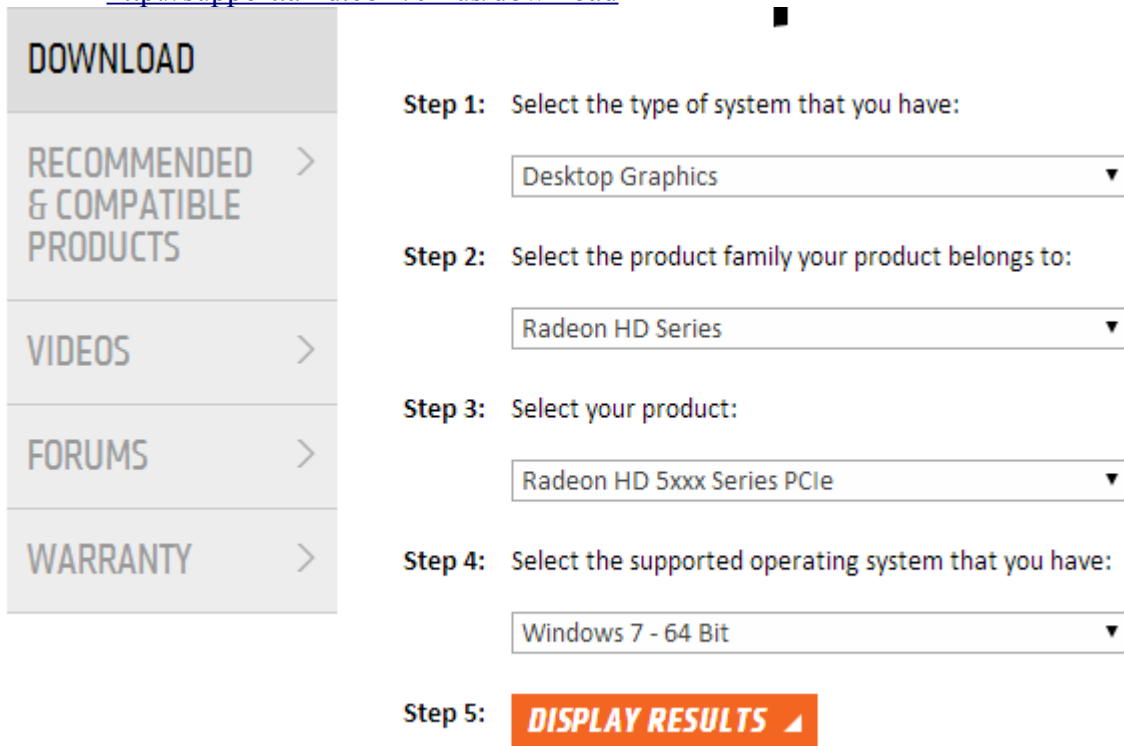
# Creating an OpenCV-OpenCL C++ Project with Visual Studio in Windows

**Written By:** Rich Shoff & Biruh Tesfaye  
**Course:** Real-Time Computer Vision  
**Date Written:** 3/16/2014

## Driver and Application Installation

This walk through uses an AMD Radeon HD 5700 Graphics Card as an example.

1. Ensure that your Graphics card is supported by OpenCL. This info can be obtained from the Graphics Card's vendor's website, or possibly Wikipedia:  
<http://en.wikipedia.org/wiki/OpenCL>
2. Download and install Graphics card driver and SDK.
  - a. Install latest AMD Catalyst Display driver.  
<http://support.amd.com/en-us/download>



The screenshot shows the AMD Catalyst Download Wizard interface. On the left is a vertical navigation menu with five items: 'DOWNLOAD' (highlighted in grey), 'RECOMMENDED & COMPATIBLE PRODUCTS', 'VIDEOS', 'FORUMS', and 'WARRANTY'. Each item has a right-pointing chevron. The main content area on the right displays a five-step wizard. Step 1 is 'Select the type of system that you have:' with a dropdown menu set to 'Desktop Graphics'. Step 2 is 'Select the product family your product belongs to:' with a dropdown menu set to 'Radeon HD Series'. Step 3 is 'Select your product:' with a dropdown menu set to 'Radeon HD 5xxx Series PCIe'. Step 4 is 'Select the supported operating system that you have:' with a dropdown menu set to 'Windows 7 - 64 Bit'. Step 5 is 'DISPLAY RESULTS' in a red button with a white upward-pointing triangle.

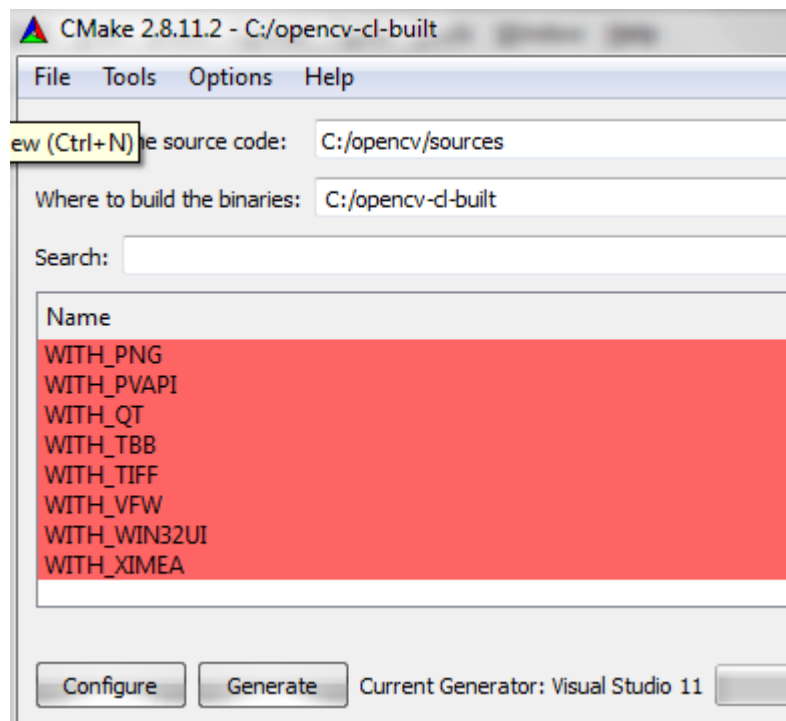
Step	Description	Selected Value
Step 1:	Select the type of system that you have:	Desktop Graphics
Step 2:	Select the product family your product belongs to:	Radeon HD Series
Step 3:	Select your product:	Radeon HD 5xxx Series PCIe
Step 4:	Select the supported operating system that you have:	Windows 7 - 64 Bit
Step 5:	DISPLAY RESULTS ▲	

NAME	FILE SIZE	REVISION NUMBER	RELEASE DATE	DOWNLOAD LINK
Catalyst Software Suite	203 MB	13.12	12/18/2013	<a href="#">Download</a>
<p><b>Description:</b>            Package contains the following graphics drivers and dependent/required software for the products specified in the current version's official release notes for the 64 bit version of Windows 7, Windows 8 and Windows 8.1:</p> <p>Display Driver ver. 13.251            OpenCL(tm) Driver ver. 10.0.1348.5            Catalyst Control Center ver. 2013.1206.1602.28764</p> <p>Languages:            Czech, Danish, German, Greek, US English, Spanish, Finnish, French, Hungarian, Italian, Japanese, Korean, Dutch, Norwegian, Polish, Portuguese, Russian, Swedish, Thai, Turkish, Chinese (Traditional), Chinese (Simplified).</p>				

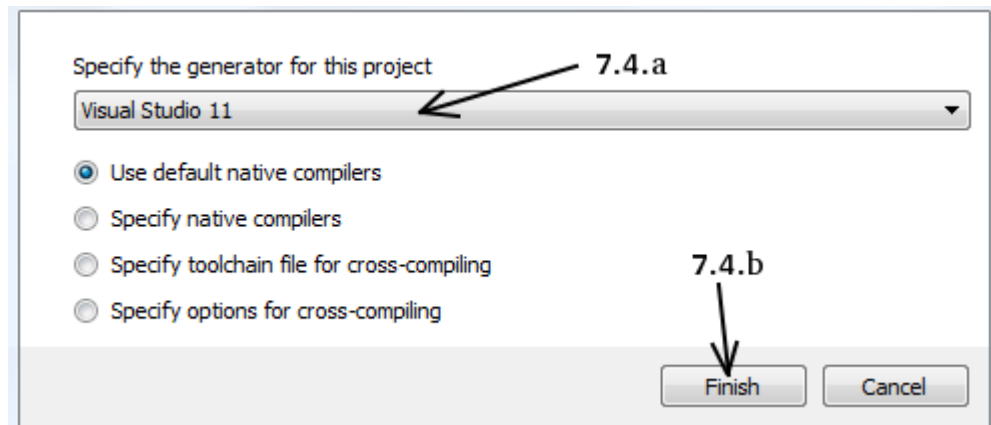
- b. Download and install the latest AMD APP OpenCL Software Development kit (SDK):  
<http://developer.amd.com/tools-and-sdks/heterogeneous-computing/amd-accelerated-parallel-processing-app-sdk/downloads/>
- c. Download and install the latest AMD APP OpenCL Math Libraries (AMDBLAS & AMDFFT):  
<http://developer.amd.com/tools-and-sdks/heterogeneous-computing/amd-accelerated-parallel-processing-math-libraries/>
3. Download and install **Visual Studio Express 2012** (or whatever you prefer) using the following tutorial:  
<http://www.microsoft.com/en-us/download/details.aspx?id=34673>
4. Download and extract **OpenCV 2.4.8** (or whichever version you prefer) to the **C:\** drive:  
<http://sourceforge.net/projects/opencvlibrary/files/opencv-win/>
5. Download and install **Cmake** from the following location:  
<http://www.cmake.org/cmake/resources/software.html>

## Create Visual Studio Project from Source

6. Create a directory called `C:\opencv-cl-built`, or whatever you prefer.
7. Open CMake-gui (Start > All Programs > Cmake-gui)
8. Fill the fields as follows (see the image below):
  - 8.1. Click on **Browse Source...** and locate the **opencv/sources** folder.
  - 8.2. Click on **Browse Build...** and locate the build folder we created.
  - 8.3. Click on **Configure**.



8.4. It will open a new window to select the compiler. Choose appropriate compiler (here, Visual Studio 11 for VS 2012) and click **Finish**.



8.5. Wait until analysis is finished.

9. You will see all the fields are marked in red. First few fields configure the build method.

**Ensure that the following items are checked.** Leaving the others as default should be sufficient.:

Name
WITH_JPEG
WITH_MSMT
WITH_NVCUVID
WITH_OPENCL
WITH_OPENCLAMDBLAS
WITH_OPENCLAMDFFT
WITH_OPENEXR

10. Once checked, click **Configure** again. Everything should turn white.

*\*\*You can verify that the AMD SDKs were picked up by looking in the bottom pane, under OpenCL. It may be different depending on the versions of your software. Here is what I saw:*

### **OpenCL:**

**Version:** dynamic

**Include path:** C:/opencv/sources/3rdparty/include/opencv/1.2 C:/Program Files (x86)/AMD/clAmdFft/include C:/Program Files (x86)/AMD/clAmdBlas/include

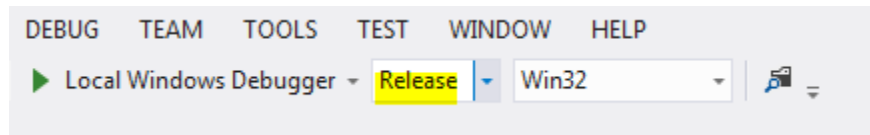
**Use AMD FFT:** YES

**Use AMD BLAS:** YES

11. Finally click the **Generate** button.

12. Now go to **C:\opencv\_opencv\_build**. There you will find the **OpenCV.sln** file. Open it with Visual Studio.

13. Check build mode as **Release** instead of **Debug**.



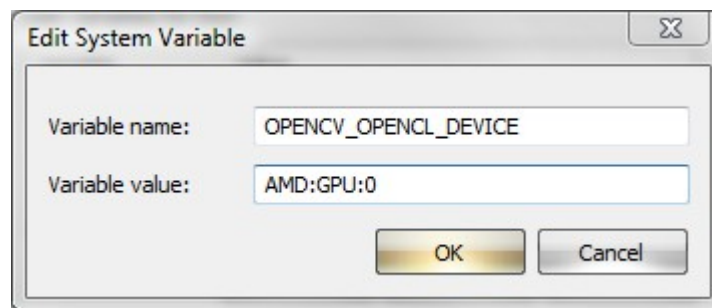
14. In Visual Studio, hit **F7** to build solution. *\*This will take a while to finish, and will amount to ~3 GB of project files.*

## Configure Devices for use

Only one step needs to be taken to get OpenCL module to recognize device (GPU in this case).

15. Enable GPU device 1 of 2 ways:

- a. In Windows, go to **Control Panel > System > Advanced System Settings > Environment Variables**, and create the following **System Variable**:



*\*More generically, you can enter **:GPU:** as a value.*

- b. Later, in your C++ program, you can use the `cv::ocl::setDevice` function (with `cv::ocl::getOpenCLPlatforms` and `cv::ocl::getOpenCLDevices`)

## Configure Project in Visual Studio

When configuring a project, there are two routes you can take to create an OpenCL project:

1. Using Existing Project:
  - a. In Solution Explorer, go to **tests performance > opencv\_perf\_ocl > Src >** and click **main.cpp** to bring its contents into view.
  - b. Insert your code into main.cpp, or create your own cpp file. Refer to **C:\opencv\sources\samples\ocl** for examples.

## 2. Creating New Project:

a. If you plan to create a new project, the binaries, libraries, and dll's were placed in the following directories

- a. **Binaries** – C:\opencv-cl-built\bin
- b. **Libraries** – C:\opencv-cl-built\lib

b. Create **New Project** in Visual Studio 2012.

c. Choose **Release** (or Debug) as your *Solution Configuration*.

d. In *Project Properties*, go to **Configuration Properties > C/C++**, and under *Additional Include Directories*, **copy/paste** the following:

C:/opencv/sources/modules/ocl/perf;C:/opencv/sources/modules/features2d/include;C:/opencv/sources/modules/highgui/include;C:/opencv/sources/modules/imgproc/include;C:/opencv/sources/modules/flann/include;C:/opencv/sources/modules/core/include;C:/opencv/sources/modules/ts/include;C:/opencv/sources/modules/ocl/include;C:/opencv/sources/modules/video/include;C:/opencv/sources/modules/objdetect/include;C:/opencv/sources/modules/ml/include;C:/opencv/sources/modules/calib3d/include;C:/opencv-cl-built/modules/ocl;C:/opencv/sources/modules/ocl/src;C:/opencv/sources/modules/ocl/test;C:/opencv/sources/3rdparty/include/opencv/1.2;C:/opencv-cl-built;C:/Program Files (x86)/AMD/clAmdFft/include;C:/Program Files (x86)/AMD/clAmdBlas/include;%  
(AdditionalIncludeDirectories)

e. In *Project Properties*, go to **Configuration Properties > Linker > Input**, and under *Additional Dependencies*, **copy/paste** the following:

kernel32.lib  
user32.lib  
gdi32.lib  
winspool.lib  
shell32.lib  
ole32.lib  
oleaut32.lib  
uuid.lib  
comdlg32.lib  
advapi32.lib  
..\..\lib\Release\opencv\_core248.lib  
..\..\lib\Release\opencv\_flann248.lib  
..\..\lib\Release\opencv\_imgproc248.lib  
..\..\lib\Release\opencv\_highgui248.lib  
..\..\lib\Release\opencv\_features2d248.lib  
..\..\lib\Release\opencv\_calib3d248.lib  
..\..\lib\Release\opencv\_ml248.lib  
..\..\lib\Release\opencv\_objdetect248.lib  
..\..\lib\Release\opencv\_video248.lib  
..\..\lib\Release\opencv\_ocl248.lib  
..\..\lib\Release\opencv\_ts248.lib

\*Where ..\..\ is the relative path of the lib directory copied from C:\opencv-cl-built\lib!!!

f. Copy the .dll files from C:\opencv-cl-built\bin\Release into the same dir as your exe.

g. Sample programs can be found in C:\opencv\sources\samples\ocl.

## Troubleshooting

ERROR: C2977: 'std::tuple' : too many template arguments

SOLUTION: Include the following Preprocessor Definition: **`_VARIADIC_MAX=10`**