Cross-Platform Mobile App Development with Visual C++

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Microsoft Most Valuable Professional

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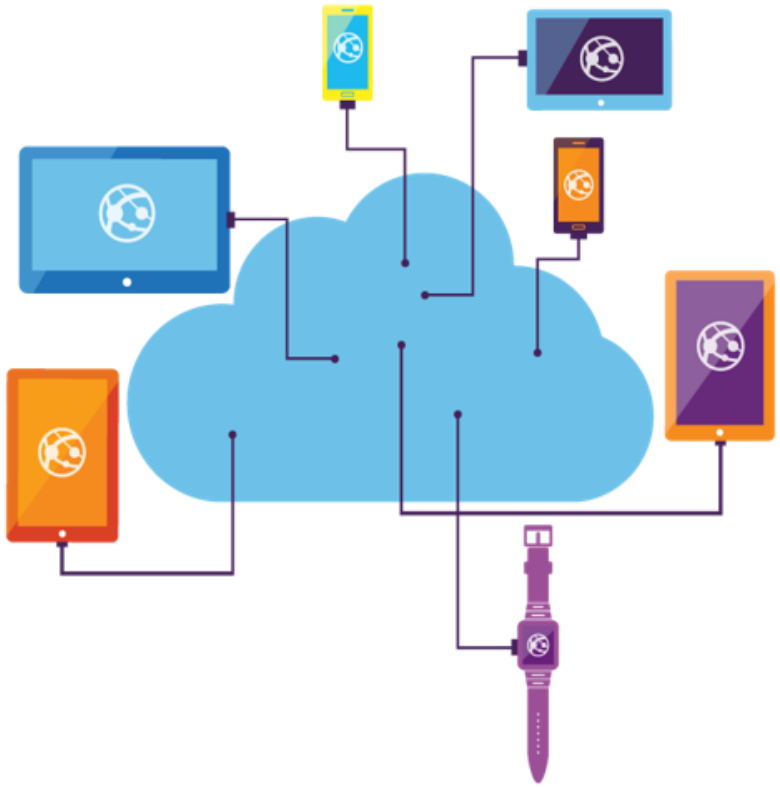
Develop for Windows Phone, Android, and iOS

More Platforms = More Opportunities



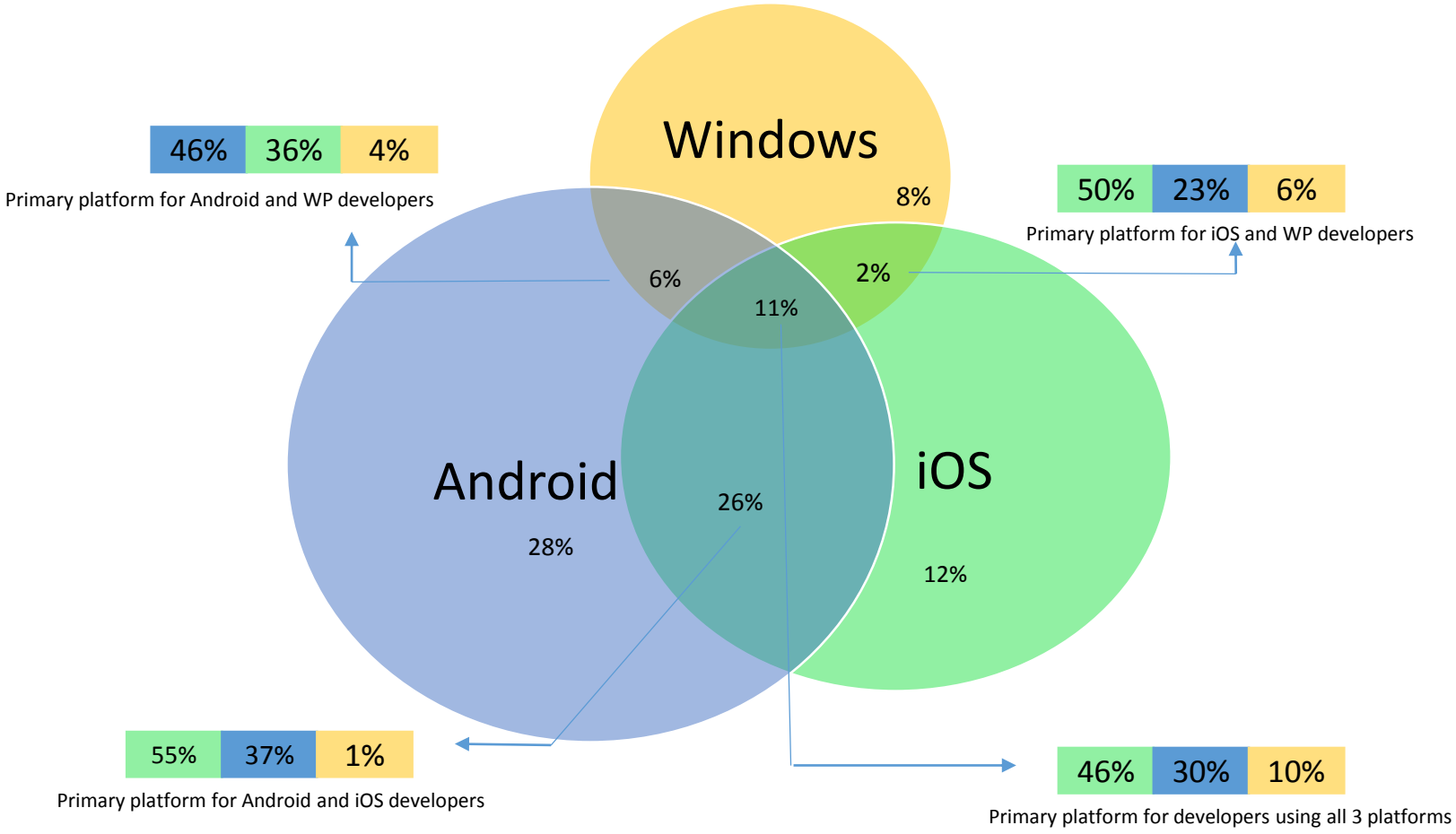
- Mobile users want to use same application across devices
- Developers want to target many platforms

More Platforms = More Opportunities

Currently 37% of all mobile developers target Both iOS and Android

Game developers on Average build for 2.6 platforms

Non-Game developers on average build for 2.2 platforms.



Survey source: Vision Mobile – "Cross-platform tools 2015"

Multi-Platform Approach?

The Silo Approach

Windows

C#, C++/CX

iOS

ObjC, Swift

Android

Java

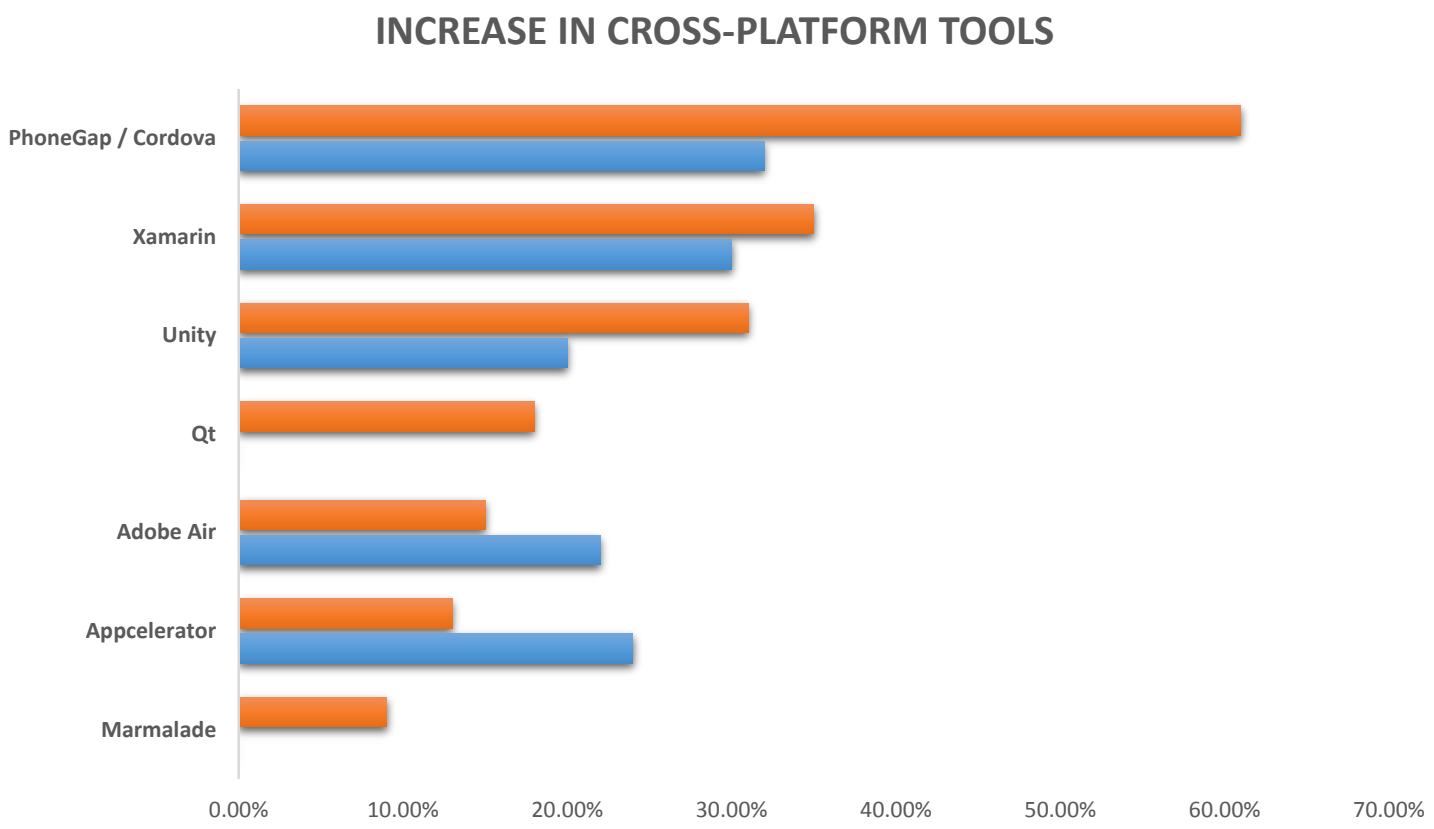
Benefits

- Full native experience
- Total access to the device as provided by the SDK
- New SDK features are immediately useable

Negatives

- Minimal code reuse
- Higher development cost
- One platform becomes the dominant platform

The cross-platform approach



Benefits

- Support a wide range of platforms
- Use existing development skills

Negatives

- No fast iteration
- Lack native look and feel
- Run-time Performance

Survey source: Vision Mobile – “Cross-platform tools 2015”

Common Denominator?

Trivia!

Android

Java

How many of the **top 100** applications on the **Android Playstore (U.S.)** leverage C++ code?

- None
- 15%
- 40%
- 75%

Trivia!

Android

How many of the **top 100** applications on the **Android Playstore (U.S.)** leverage C++ code?

- None
- 15%
- 40%
- **75%**

Java

C++

Top 100 Android Playstore applications (U.S.)

Android

Java

C++

- Messenger
- Facebook
- Pandora Radio
- Instagram
- Minecraft
- Snapchat
- Spotify Music
- Du Speed Booster
- Twitter
- The Game of Life
- Super Bright LED FlashLight
- Soda Saga
- Skype – Free
- Whatsapp Messenger
- Clean Master
- Netflix
- Kik
- Crossy Road
- Clash of Clans
- Amazon Shopping
- Candy Crush e IM and Video Calls
- 8 Ball Pool
- Glass Tower
- Subway Surfers
- Pinterest
- Cooking Fever
- Zedge Ringtones and Wallpaper
- Word Academy
- Poshmark - Buy and Sell
- Candy Crush Saga
- Dragon Blaze
- Marvel Future Fight
- Emoji Keyboard
- DU Battery saver
- SoundCloud - Music and Radio
- Monopoly
- Twitter
- CM Security Antivirus
- Slots - Journey of Magic
- Yahoo Mail - Free Email App
- iHeart Radio - Radio and Music
- Temple Run 2
- Boom Beach
- Despicable me
- ebay
- Wish - shopping made fun
- Trivia Check
- Juice Jam
- Game of War - Fire Age
- TouchPal Keyboard
- Geometry Dash Lite
- Flow Free
- Bird Climb
- Coin Dozer
- Uber
- Google Earth
- Flow Free
- Bird Climb
- Coin Dozer
- Uber
- Google Earth
- Archery Master 3d
- Go Keyboard - Emoji
- ooVoo video call
- Inbox by Gmail
- Samsung Smart Switch Mobile
- Tango - Free video call and chat
- Earn to Die 2
- Fruit Ninja Free
- Farm Heroes Saga
- Wallapop
- Capital One Wallet
- Truck Driver 3d: offroad
- Solitare
- Plants vs Zombies
- Hidden Object - Marrinotes
- Tinder
- DropBox
- Hulu
- Extreme Car driving simulator
- The Sims 3
- Word Search
- Hidden Object - Marrinotes
- Tinder
- Hulu
- Extreme Car driving simulator
- Need for Speed Most Wanted
- Angry Birds
- Shazam
- MyRadar Weather Radar
- Vine
- Line: Free calls and messages
- Waze Social GPS Maps
- Google Translate
- Don't tap the white tile
- Panda Pop
- EA Sports UFC
- Flipagram
- Hill Climb Racing
- Tasty Tale - The Cooking Game
- Yelp
- Offer Up - Buy, sell
- CM Launcher - Boost, Secure
- Temple Run
- Empire and Allies
- Google Docs
- Tetris
- Battery Doctor
- Beats Music
- Walmart
- Surgery Doctor
- EA FrostBite

C++ the common denominator

Windows

C#, CX

C++

iOS

ObjC, Swift

C++

Android

Java

C++

Benefits

- Full native experience
- Total access to the device as provided by the SDK
- Code Reuse (own + 3rd party)
- Performance
- Battery life
- Security

C++ the common denominator

.appx

XAML

C# | C++/Cx

Pinvoke
C++ Wrapper

.apk

XML

Java

Java/C++
JNI Wrappers

.ipa

Cocoa Touch

ObjC Wrapper

Shared C++ backend is compiled as:

.appx	.apk	.ipa
C#, C++/Cx	Java Dex / ART	ObjC Swift
Dynamic Link Library (.dll) Static Library (.lib)	Dynamic shared library (.so) Static library (.a)	Static library (.a)

Shared C++ Backend

bing maps

DropBox

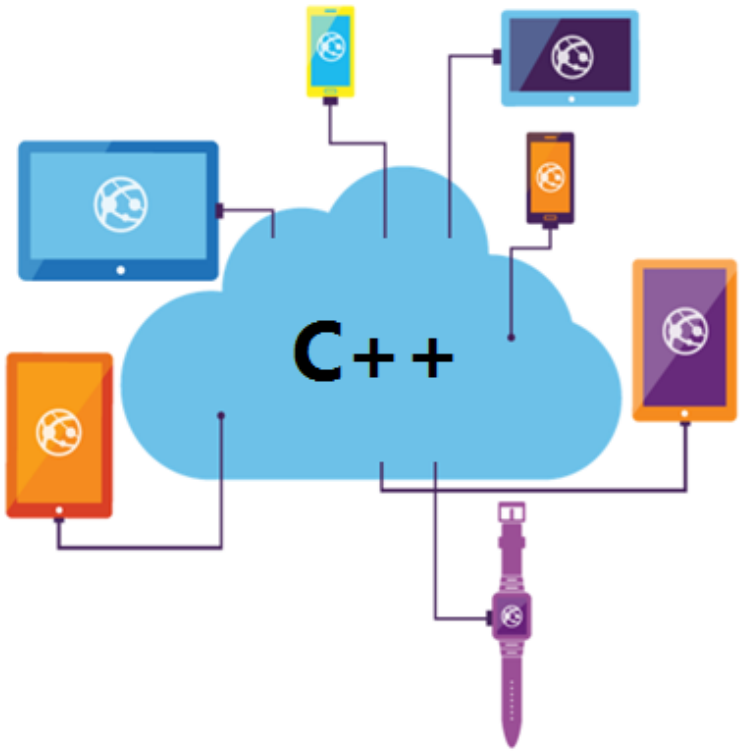
Moments

Development tools for C++ cross-platform




Compilers	Visual C++ Compiler	GCC Clang/LLVM	Clang/LLVM
Build Engine	MSBuild, Nmake	NDK Build, Make files, Gradle, Ant	Xcode Build
IDE(s)	Visual Studio	Eclipse CDT	Xcode
Host Platform	Windows 8/8.1/10	MacOS X, Linux, Windows	Mac OS X

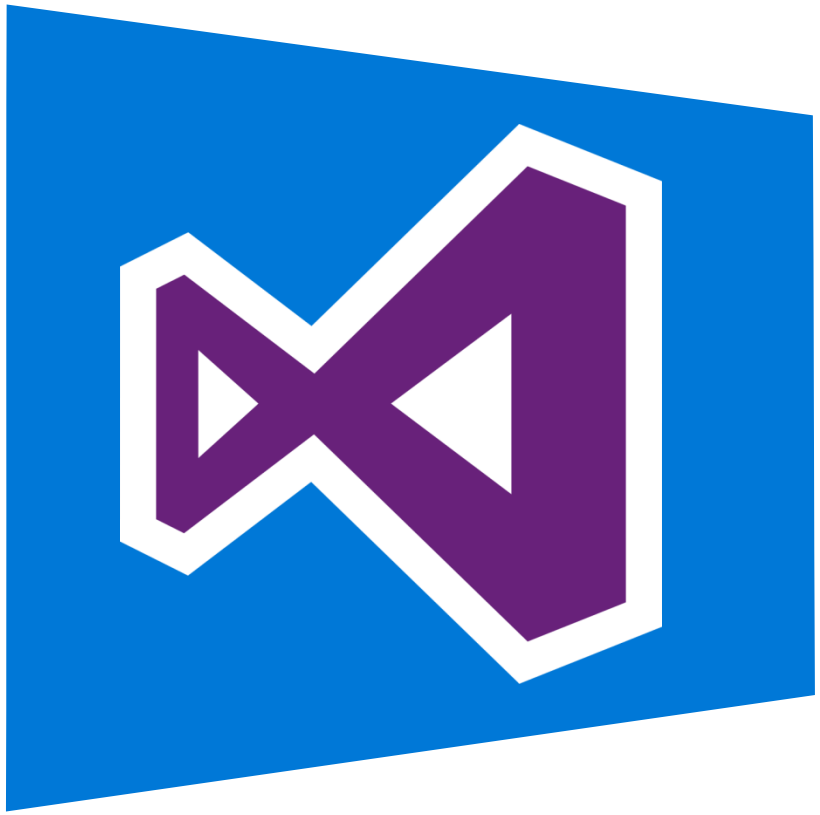
Challenges with C++ cross-platform mobile



- Multiple installation experiences
- Multiple C++ IDE(s)
- Maintaining multiple build tools and build systems
- Debugging experience is not ideal

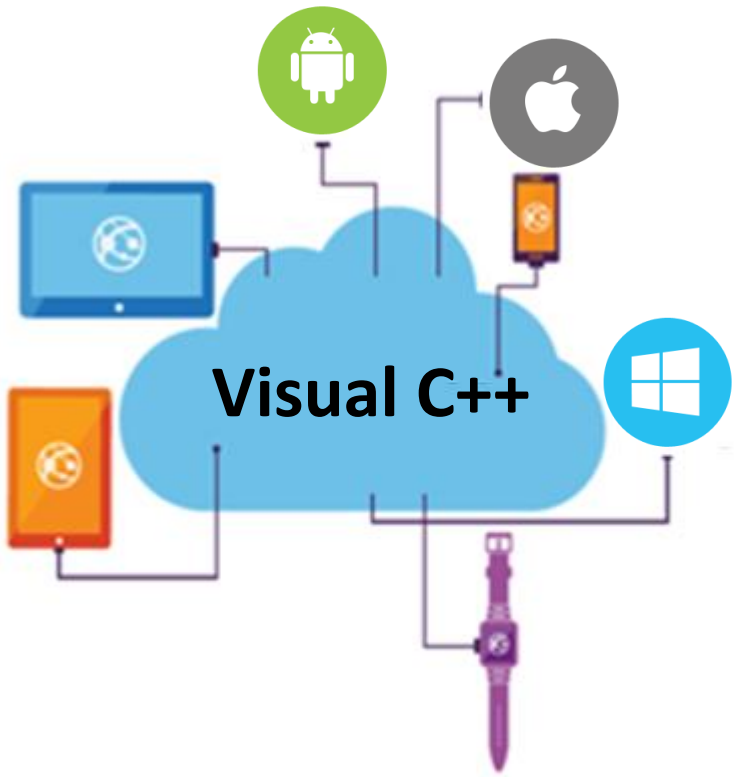
Wish list for C++ cross-platform mobile

- **Easy** to install
- **Single** installer
- **One** C++ IDE for your cross-platform needs
- **Share** and **reuse** cross-platform code
- **Emulation** support



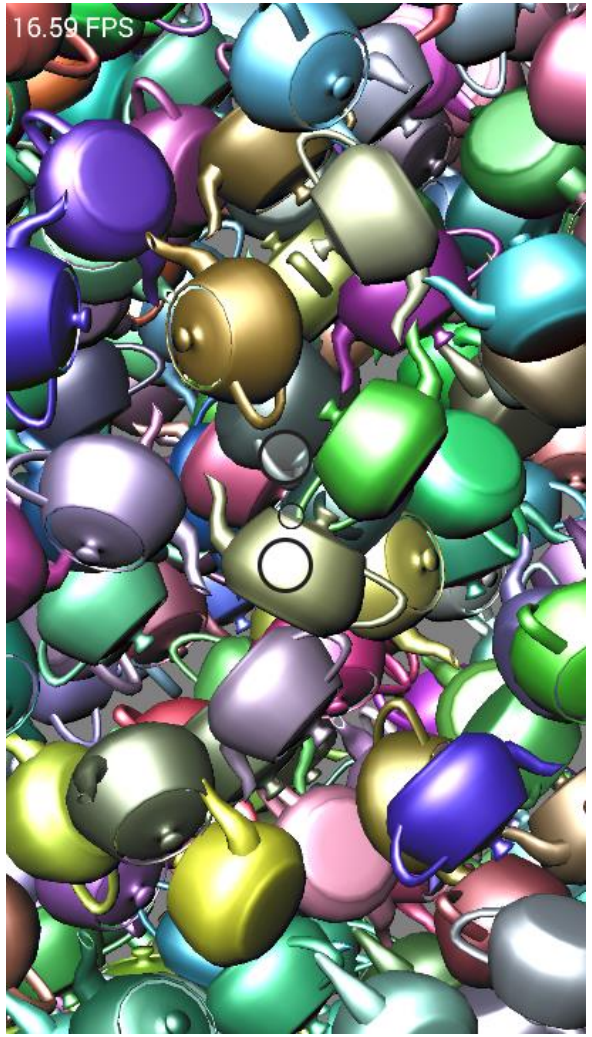
Visual C++

Visual Studio 2015 RTM



- **Easy** installation
- **One** C++ IDE for your cross-platform needs
- **Share** and **reuse** cross-platform code
- **State of the Art** code-editing features
- **Powerful** debugging experience
- **Fast** emulation

Demo 1: Developing for the Android Platform



Description

More TeaPots Native-Activity Android application. Mostly ‘C++’ code with a little Java wrapper

Feature Capabilities

- Eclipse Converter to Visual Studio
- Building Android Native-Activity application
- Parallel compilation
- Clang – GCC toolchain
- Android Code Editing (Refactoring, Intellisense)
- Android Native Debugger
- Logcat Viewer
- Fast Emulation

Demo 2: Cross-platform OpenCV app

Description

An OpenCV based Image Manipulation cross-platform application targeting the Android and Windows platform

Feature Capabilities

- Cross-Platform Mobile Application
- Easily share code easily across mobile-platforms
- Cross-Platform productivity features (Intellisense, refactoring)
- Powerful debugging (NATVIS)
- Build Simultaneously

Demo 3: Building Xamarin-C++ Android Apps

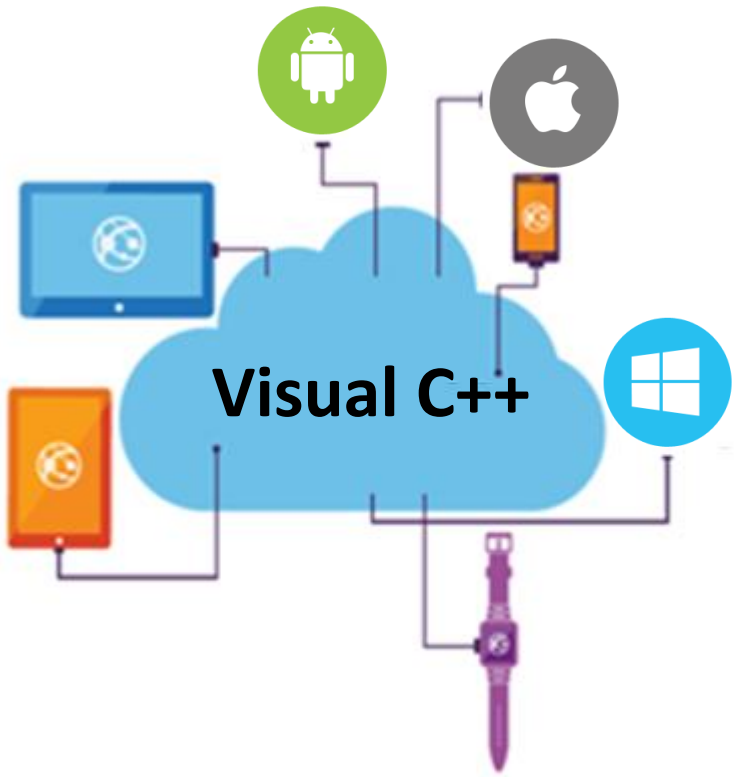
Description

Xamarin OpenGLES Android application leveraging C++ code being developed in Visual Studio.

Feature Capabilities

- Building Xamarin-C++ android libraries
- Debugging Xamarin-C++ code
- Fast Deployment

What's coming!



- Java language service and debugging support
- Cmake support (Project Generators)
- Project importers (Android Studio, Xcode)
- Platform targeting (Arm64/x64)
- New Android NDK, iOS SDK targeting

Resources

- https://www.visualstudio.com/en-us/features/cplusplus-mdd-vs.aspx

- blogs.msdn.com/b/vcblog/

- **Ankit Asthana** *(aasthan@microsoft.com)*
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