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Emulating Everything

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Abstract— The way we work and where we work changed dramatically over the years. No, no, we aren't talking about our growing reliance on computers and the Internet, we're talking about is a small subset of it. If you needed to run a specific program or a game, you needed to have a specific kind of device for it. Want to run a Windows compatible program? Get a Windows computer. Want to play a PlayStation title? Get PlayStation. Want to run Android app? Get a compatible Android device. But over times, things have changed. Besides our computers growing more powerful, something has obviously happened. We now also have plethora of tools and services that let us run software meant for one device on other devices across various platforms.

WHAT ARE EMULATORS ALL ABOUT?

INTRODUCTION

IN a nutshell, an Emulator is hardware or a piece of software, which is capable of - in the simplest sense of word – faking being something it isn't. The emulator tricks the hardware/software it's running on into believing that it's something else to get a specific task done without raising suspicion or worse, getting caught.

In technical sense, it is software or hardware that recreates an environment. It does this by including variables such as memory, storage, space and processing needed by particular software of hardware to run.

The idea of emulation is based on a Church-Turing thesis, which says that any computable function can be performed on a theoretical device called a "Turing Machine". In other words any general purpose programming language is capable of running any algorithm.

To achieve this, an emulator converts binary data written for execution on one machine to an equivalent binary form meant for execution on another machine.

Making an emulator is hard. It requires comprehensive understanding of how each hardware piece works, handling their behavior and coding them into the emulation software as well.

WHY DO WE NEED EMULATOR?

In software industry, for example, emulator are used to not only run program that today's operating system refuse to run, but also design software for future hardware, so that once those hardware are available, they already have the needed software –saving lots of time.

Developer use this all time. All the software development kits send to them by companies often include an emulator.

This can convey to the developer, say what an Oculus Rift feels likeand what are the different constraints to be kept in mind while making applications for it. Furthermore these emulators are fast, which means faster testing than by their original counterpart and more refinement.

You can find old music album the 50s or an old movie title the 1900s, but for whatever reason, obtaining an old video game isn't possible anymore.

For the same reason, emulators are also widely used as data preservers. They're capable of maintain the original look, feel required system environment. It's been used in media industry for quite some time now to preserve the quality and state of media files in its original form for future usage.

ARE THEY LEGAL?

Most companies don't mind letting you emulate their operating system, console environment or any other product, as long as you have the license for it and are not using it for commercial purpose. Some including Nintendo, strictly prohibit use of their ROMS on the grounds of copyright violation.

OS- CEPTION

The mysterious art and science of running OS within an OS within an OS:

There are many operating systems and each one has dedicated purpose. Having the required operating systems installed on different devices isn't feasible. Partitioning your hard drive isn't the ideal choice to go with, and you would have to reboot your machine every time you needed to switch between the operating system.

Virtualization lets you run an operating system within your primary operating system. It does need a lot of resource to function smoothly, but nowadays most computers are powerful enough to multiple operating systems within. It

doesn't matter whether you're a software developer or someone who wants to try out new operating systems, virtualization lets you switch between your primary system and the operating system you desire to use.

WHAT ARE VIRTUAL MACHINES?

Virtual machines are computer programs that can run an operating system in a window on your current desktop. These program create a virtual computer, fooling the operating system into thinking that it's running on a real computer. Although the virtual machines runs as a normal process on your current operating systems. You open up the virtual machine just like any other program and boot up the operating system right inside the program. Your current operating is called the "HOST" while the operating system you will be running on the virtual machine is called the "guest".

The virtual machines also emulates the necessary virtual hardware devices and ports like the CPU's memory, network card, hard drives USB ports and other devices. The virtual devices are directly mapped to the physical hardware devices of the host.

WHY WOULD YOU USE A VIRTUAL MACHINE?

Test new versions of operating systems: You can run the development version of Windows 10 in a virtual machine on your Windows 7/8 computer. This allows you to experiment with Windows 10 without installing an unstable version of Windows on your computer.

Test new versions of operating systems: You can run the development version of Windows 8 in a virtual machine on your Windows 7 computer. This allows you to experiment with Windows 8 without installing an unstable version of Windows on your computer.

Use software requiring an outdated operating system: If you've got an important application that only runs on Windows XP, you can install XP in a virtual machine and run the application in the virtual machine. The virtual machine is actually running Windows XP, so compatibility shouldn't be a problem. This allows you to use an application that only works with Windows XP without actually installing Windows XP on your computer – especially important considering many new laptops and other hardware may not fully support Windows XP.

Run software designed for another operating systems: Mac and Linux users can run Windows in a virtual machine to run Windows software on their computers without the compatibility headaches of Wine and Crossover. Unfortunately, games can be a problem – virtual machine programs introduce overhead and no virtual machine application will allow you to run the latest 3D games in a virtual machine. Some 3D effects are supported, but 3D graphics are the least well supported thing you can do in a virtual machine.

Test software on multiple platforms: If you need to test whether an application works on multiple operating systems – or just different versions of Windows – you can install

each in a virtual machine instead of keeping separate computers around for each.

Consolidate servers: For businesses running multiple servers, existing servers can be placed into virtual machines and run on a single computer. Each virtual machine is an isolated container, so this doesn't introduce the security headaches involved with running different servers on the same operating system. The virtual machines can also be moved between physical servers.

VIRTUAL MACHINE SOFTWARES

There are manyvirtual machine software out there available for all your platforms Windows, Mac, Linux.

Virtual Box is a great, open-source application that runs on Windows, Mac OS X, and Linux. One of the best things about Virtual Box is that there's no commercial version – you get all the features for free, including advanced features like "snapshots," which allow you to take a snapshot of a virtual machine's state and revert to that state in the future – a great feature for testing

VMware Player is another high-quality virtual machine program for Windows and Linux. VMware Player is the free counterpart to VMware Workstation, a commercial application, so you don't get all the advanced features you would with Virtual Box. However, both Virtual Box and VMware Player are solid programs that offer the basic features – creating and running virtual machines – for free.

Parallels Desktop:
QUMU:
Hyper-V
KVM:

Running software on other platforms
1.wine
2.cygwin
3.wine for ARM

EMULATING A MOBILE OS ON A DESKTOP

Mobile apps are currently so popular that all you have to do is think of need and developer will make hundreds of different app for it. Apps are not just limited to the categories of productivity and social networking; games are in big demand as well. A few years ago, it wouldn't have been possible to see the kind of beautiful games we see now on mobile devices. However we're limited to enjoying these on the tiny screens of our mobile and tablets. How many have you wished that you play Dead Trigger on a bigger screen? Or use your desktop keyboard to chat on whatsapp? Fret not, because now mobile emulators are here. These emulators make it easy for the developer to recreate those games for you to let enjoy the experience of mobile apps and games on your desktops. Let's talk about the purposes for which mobile emulators are used.

Testing and debugging apps:
Mobile apps are becoming increasingly powerful by the day. Some are even being used to control cars (James Bond, anyone?) and drones. With the immense number of mobile

phones being released in the market, it's simply not possible and feasible for app developers to buy each and every device available in the market. In such a scenario, mobile emulators come to the rescue, as they emulate the software environment of a mobile phone on a desktop, thus allowing developers to install apps on these emulators and test tem.

Testing and debugging websites:

Reports from around the world indicate that more people browsing and working online from their mobile phones than ever before, and this trend is only set to increase. You may have noticed that your favorite website differs in looks and functionality – be it the layout, adjustments in size or operation of the website – depending on the device or browser on which it's being accessed. This is because developers rate a separate version of the website for access on mobile devices. For this, they need to test the website code on mobile browsers' again it isn't feasible to test the website on different browsers installed on devices with different display sizes. Mobile emulators enable developer to test their websites on different emulated devices with different screen sizes.

Running apps and games:

Earlier, the term 'emulators' was only known to developers and uber geeks, but now this scene is changing as emulators are going beyond their role of simply being software used for testing and debugging apps and websites. Emulators are now being increasingly used to display mobile apps and games on a bigger screen (Candy Crush fans, this one is for you(. Imagine playing Hungry Sbark or using your favorite app on a much bigger screen. This is especially convenient if you frequently use apps.

What are the issues in using mobile emulators?:

Your website or app may work flawlessly on an emulator, but could show some issue on the real device. This might happen because the emulator differs in some minor ways from the actual device or there could be other variables involved. A few reasons for this are that the emulator developer might not be the device creator, or that the actual device suffered from issues such as overheating or component issues.

What are the types of mobile emulators?:

☐ Device emulators: These are emulators for specific device (or a set of devices) provided by the device manufacturers themselves. They're excellent for testing an app or a website with near-perfect results.

☐ Browser emulators: Mobile browser emulators display mobile versions of websites. They're good for testing websites with the mobile browser's functionality, but not the best for device specific testing.

☐ Operating System (OS) emulators : They simulate a mobile device environment in which other mobile apps can be accessed and tested.

Some Popular Desktop-Based mobile emulators
1. Android Studio
2. Genymotion
3. Youwave
4. BlueStacks
5. Andy

6. Droid4x
7. Xcode
8. iPadian
9. Smartface Studio
10. Xamarin

EMULATING THROUGH BROWSERS

Cloud Computing is future. But what about everything that led up to this marvel of technology that made everything less complicated? You've probably come across several statistics about how the smartphone you hold in palm of your hand is 700 times more powerful than the computer that put rockets into outer space a few decades ago. And like a photographer of today paying homage to the medium that stared it all, as users of computer every minute of our lives, we must give due respect to the platforms that started it all.

Android Apps as a Chrome Extension:

ART or Android Runtime is what runs apps on Android. It replaced Dalvik and a something similar is going to be running your apps on Chrome. Compatible with Chrome 37 and beyond, ARC or App Runtime for Chrome is the run time that lets you use android apps on Google's Chrome OS. While the original run time isn't compatible with any other OS, developer vladikoffdeveloped the ARChron Custom Runtime while lets these apps run on Windows, OS X and Linux.

Firefox OS Simulator:

IF Google have their own smartphone OS, so do Mozilla. Their Firefox OS is an open source community supported mobile phone OS with ambitious goals of taking on the likes of Android and iOS. Just like how Android apps can be used on the Chrome browser, Mozilla have clubbed the previous two subheadings and come out with an extension for the Firefox web browse that allows you to test your apps from the comfort of your home.

HARDWARE DEVICE EMULATION

Optical disk emulation:

We've already gone on about how optical disk drives can be emulated, but there is more to them than we have covered here. While Microsoft's official optical disk emulation software (Virtual CD-ROM Control Panel) is useful it only works with iOS images, and there are a lot many more formats out there. If you want to deal with them, you will need better optical drive emulations software. Let's also look at why there are so many formats for storing the same kind of information, why doesn't everyone just use iOS files? The answer is that is DRM.

Back before online activation because ubiquitous, a common way to prevent piracy was to require that the user keep the disk that came with the software inserted in the drive while the software was running – or in some cases when the software launched or at random times when asked. The presence of the disk would signal to the software that it was legally purchased, this forced a single computer to run the software at any given time.

Gamepad emulator:

We're going to look at "gamepad emulators" a little differently here. While there are tolls that emulate the presence of a gamepad when there is none, and take input from the mouse and keyboard instead, such tools are usually limited in use to within aging console emulators. Other gamepad emulators such as the x360ce take non-XBOX360 game controllers and make them appear to the computer as an XBOX360 controller, since many games only support those.

Printer emulator:

If you don't have a printer attached – who uses a printer these days any way the print function can still be of some use.

Printing a document is useful if you want to create an uneditable version that preserves the formatting of the document. For this can easily find virtual printers that output PDF file instead of actually printing anything.

EMULATORS FOR MOBILE DEVICES

So far we've discussed emulators for the desktop platform and web browsers. But what if you needed to try similar software on your mobile devices? Wouldn't be great if you could run console games on your smart phones and tablets? But will it possible to emulate anything on Apple's iOS? What about windows Phone? Is there any emulator available for Microsoft's mobile operating system? In the pages to come, we will be discussing emulators for mobile devices, and how performance efficient they are.

There are a plenty of emulators available for mobile devices. But their usage is, to a great extent, limited to gaming. The said, if you're looking to reminisce about your childhood days and play NES, SNES, PlayStation, Sega Genesis, N64, GBA, PSP, Nintendo DS titles on your mobile devices, there is an abundance of emulators available to make that possible.

Super Nintendo Entertainment System (SNES):

Developed by Nintendo, the Super Nintendo Entertainment System was a generation upgrade to the NES as if offered support for 16-bit games. It a generation upgrade to the NES as if offered support for 16-bit games. It also offered advance graphics and audio capabilities. It is often regarded as the best handheld gaming console of all time. The Senes9x EX is the most popular emulator for this console.

Snes9x EX for Android:

Often referred to as the ultimate SNES emulator by gamers, the Sens9x offers the best compatibility with SNES titles. The app offers a ton of great features such as support for cheat, online multiplayer, image up scaling, and video filters. It also comes with a feature called "Turbo Mode,' which forces the game moving at snail's pace and fast forward it to the interesting parts.

The app doesn't demand for a lot of resources as it is able to offer near perfect emulation on any handset with a processor as low as 1GHz. It is available for free via the Google Play Store.

For Nintendo DS:

Launched years after the original NES, Nintendo DS is also a handheld gaming console. It come with a dual-screen, microphone and support for wireless connectivity. It provided consoles with the ability to directly interact with each other over Wi-Fi well as the Nintendo Wi-Fi Connection service.

DraStic for Androil:

DraStic Nintendo DS emulator arrived on the Play Store in 2013 and within a few days after its launch, it managed to impress a lot of Android users. Unlike most of the existing DS emulators – which use similar code as used in Windows programs (resulting in unbearably slow performance on Android) DraStic runs on ARM processors and can offer a smother performance even on a smartphone with 256MB of RAM.

EMULATING BROWSERS

Emulating isn't restricted to operating Systems or old school arcade gamming alone. It's also possible to emulate different web browsers. This can be done by recreating the environment of one browser on another; browsers are emulated for the purpose of cross browser testing.

Google Chrome Emulator Mode:

If you're using Google Chrome, look no further than your browser for an emulator. Google integrated the emulator into Chrome last year with the release of Chrome 32. Limited only to mobile devices, it supports and glut of devices including iPhone, iPad, Nexus, Lumia, Galaxy and a line-up of many more phones.

To enable the emulator, first navigate to the web page that you want to test and go to 'Developer Tools' by navigating to Menu > More tools > Developer Tools. Click on the small mobile phone icon located at the top of the Developer side panel and choose the device, screen, used agent and sensors.

CONCLUSION

Picking the right virtualization or emulation tool is totally dependent on your requirements. If you want to play around only with the features of one particular operating system then virtualization is a better choice, but if your intention is to use the operating system to check out a few applications, then using Wine or Cygwin would be preferable.

Not all emulators provide 100 percentage results. This makes the task of finding the right emulator tough and time-consuming. The accuracy is concerned with the rendering engine alone and not the layout. All the emulators are capable of laying out web pages across different deceives perfectly.

Emulators are a neat and handy way to test web pages across different browsers and devices. If, however, you're concerned about the accuracy, don't rely on the emulators and instead use the actual browser. In the case of testing the layout across different devices, emulators are the only options to you have.

REFERENCES

[1]. Computer Architecture: A Quantitative Approach by John Hennessy and David Patterson

[2]. The Elements of Computing Systems by Noam Nisan and Shimon Schocken

[3]. Virtual Machines by James Smith and Ravi Nair

[4]. Reversing: Secrets of Reverse Engineering by Eldad Eilam

[5]. Hacker's Delight by Henry S. Warren, Jr.

[6]. I want to be a game developer... now what? by GameFromScratch.com

[7]. Statically Recompiling NES Games into Native Executables with LLVM and Go by Andrew Kelley

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