PROBOTEK

Era of the Cloud Computer
(White Paper)

"*We live in the age of information.*"

Introduction
Indeed, we are. information is everywhere. It has always been there and will always be!

It took us, humans, thousands of years to understand the significance of information and lastly to invent ways to harness its power. In our current era, we use computer systems, operating systems, millions of software, smart phones, tablets, etc. and a plethora of peripheral devices that consume, process data and then produce new information. Further than that, we have the ability to access information with tremendous capacity and speeds over fiber Ethernet connections, A/V-DSL lines, WiFi, 4G/5G GSM and more to come.

In the same era, we have in our hands a great tool, the Internet. It really is fascinating how we can interconnect all the globe's knowledge and utilize multiple sources, get people to work together and deliver results in matter of seconds to a few hours!

Personal computer, a concept of the past century
However, no matter how we perceive computing and information not much have changed in our perception of the personal computer. We all think of some sort of physical device when referring to a personal computer and that's just fine. But is it really necessary?

What if in the era of the Internet and the cloud, a personal computer is not what you need? What if all you need is an account? Think of that for a second. You use hundreds of applications and services on the web everyday right? Do you really require a specific device to do that? The answer is certainly no!

My point is that when you watch video, use Google Docs, access Facebook, etc. you don't really need a specific device in front of you. Practically, not even a very capable computer or smart device. What you require is just a terminal with a screen, possibly a keyboard and a mouse (if not a touch screen) and access to the Internet. So, using a fast enough Internet connection and a typical device you literally have all of your stuff there happening on the servers. In other words, on the cloud!

The power of the cloud

Here is where ultra power users and mostly gamers join the discussion with some strong and valid arguments. Hey man, they would say, I have a question for you: "How am I going to work with my professional sound cards or how can I play my favorite super demanding games on a browser?"

Let me explain. Most of you have never heard of computing farms used in research centers, never heard of AI computer farms, haven't searched for sound/studio cloud farms and lastly haven't noticed Live24 and Google Stadia that utilize specialized ultra fast servers equipped with NVIDIA graphic cards to run the games on the servers. All the previous examples run the demanding processes on specialized hardware and deliver the results over a connection back to you. So, yes dear gamer, you can play a game on the browser. All you get is the rendered result (the frames of the game) on your screen, even on your smart TV!

Cloud computer era

So let's get back to this question: "What if all you need is an account?"
Let me put it in another way. What if all you need is a Cloud Computer?

Right now, you begin realizing that having a physical device which you call a personal computer sounds silly and useless…

This is where the story of GreyOS begins!

The story behind GreyOS

Almost 8 years ago, I began writing an open source web-based desktop interface unlike anything you've seen before. I didn't want it to be just a web desktop, though. What I was looking for was a complete ecosystem of apps and tools on the web. I was trying to literally get rid of my laptop. I wanted to have access to all of my documents and applications regardless of device.

For that to happen, I had to invent a system or better a platform that mimics the essentials of a traditional operating system to emulate the same functionality but, on the cloud.

At that time, the development of a “Web OS” as I used to call it, was just a dream and a difficult one to implement. So, I went online, did my research and I found nothing promising or close to what I was looking for. More specifically, I found just a few platforms that were simply/silly graphical representations of desktop environments. There were no real apps, just floating graphics, no interaction among them, no interfacing APIs, no back-end. Just fancy graphics!

Again, I wanted something “alive”. Something that interacts with integrated web apps and lives in an entirely new ecosystem. This is the time where I also began realizing how fascinating that would be. An entire OS on the cloud!

Then the name came to me. “GreyOS”, yes this was it. Something that sounds professional, robust, steady. Not too thick, not too fancy. Just as it should be.

The market

Personal computers are not evil, OK. But, you buy a certain piece of hardware and then you pay even more for extensions, upgrades, buy more software, etc. to catch up with the demand of the market the next day.

On the other side, the ability to let anything happen on the cloud, to self-adapt on any machine regardless of hardware capabilities, to dynamically utilize computing resources and have a dependable and secure infrastructure, to use as much space you want at anytime and pay (if ever) a fraction of what you would pay for a physical/classic computer, is just unbeatable!

Further than that, in the IT business, a common cloud computer platform & interface with such capabilities is a strong tool in the hands of the enterprise. For example, at PROBOTEK we built platforms and an entire ecosystem to facilitate hard and complex operations. Under certain scenarios we use GreyOS as well. Now I wonder, what things can businesses around the world achieve with GreyOS.

Just imagine the possibilities...

GreyOS

GreyOS is the world's first Cloud Computer (CC).

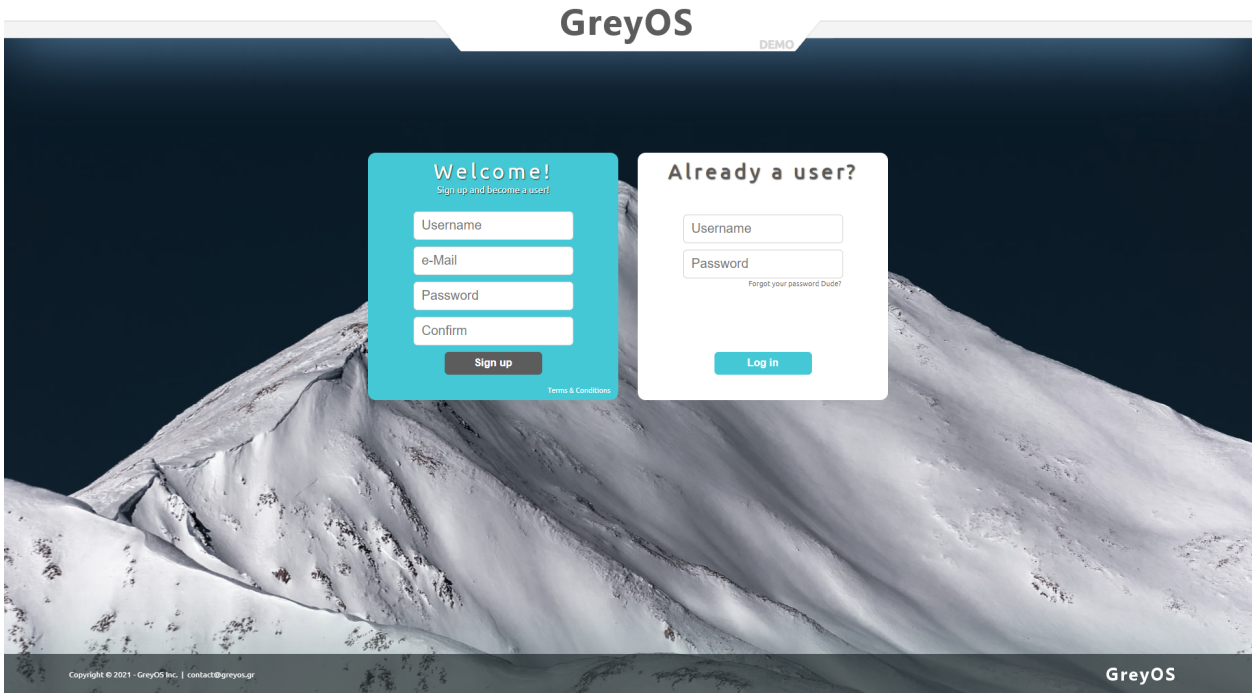
Well, basically, GreyOS mimics a traditional OS and extends well designed and tested architectures on the cloud. In that sense, GreyOS is not a traditional OS per say but a Meta-OS.

On top of that, it presents an interface that mimics the functioning of a personal computer. Thus, the end result is a CC in contrast to a PC.

GreyOS consists of a set of in-browser services and apps and a remote platform that utilizes a microkernel architecture on the cloud. The core (microkernel and peripheral software) sits on a cluster of VM, running specialized Linux. The core infrastructure is behind firewalls and load balancers to achieve best security and availability. For that to happen the proposed robust cloud infrastructure is AWS (yes I love AMAZON).

Also, all of the services and provided applications run on their own CDN or their own clusters either on AWS or any other cloud or servers and can be accessed from anywhere.

In other words, GreyOS is a Distributed, n-tier Zero-Fail OS. No other OS can offer that!



Requirements of GreyOS
Requirements? What is that...?

GreyOS is the fastest and most robust OS you ever had. It requires just a few hundred MB of RAM and a small quad core CPU. Basically a machine that dates back to 2006 is ideal!

Remember that all happens on the cloud. So basically, the “requirements” are just the absolutely minimum specifications of a device that gives you a fast boot time, some decent in-browser rendering and a stable connection on the Internet.

So, you access your cloud computer from anywhere using a browser and you use an OS that never hangs, never delays, never lets you down no matter what. Not to mention that it is always on, needs no restart, nor shutdown, no updates, no upgrades and certainly no need for drivers… not even to logout.

Technology of GreyOS

GreyOS is built on top of the following technologies:

- Back-end
  - AWS
  - Linux
  - NGINX
  - micro-MVC
  - ALPHA CMS (Obsolete - to be removed)
  - PHP
  - Python
  - Bash
- Front-end
  - micro-MVC
  - HTML5
  - JS
  - Browser API (Chrome, Firefox, Edge)

Why GreyOS is considered an OS

GreyOS is a “Meta-OS”.

A Meta-OS is very different from a traditional OS, but certainly an OS by definition in computer science (https://en.wikipedia.org/wiki/Operating_system).

GreyOS, as we explained before, follows a microkernel architecture and as such only very critical systems are managed in the kernel space. Most work is being managed in the user space on-demand.

The kernel of GreyOS is “CHAOS”. CHAOS does the absolutely minimum operations on the cloud and has very little interaction with the browser. Many instances of CHAOS microkernel can be utilized to achieve better performance for non-blocking operations under extremely heavy load (something like 1.000.000 concurrent users on one VM). Also, CHAOS kernel instances can run independently in bare hardware or autonomous VM to serve much higher loads (something like 100.000.000 concurrent users).

Similar to a traditional microkernel, CHAOS provides (cloud interactive):

- Computing resources management
  - CPU management (Scheduling of processes/tasks on the cloud)
  - RAM management (Allocation of memory on the cloud)
  - Clustering (Dynamic use of cloud machine)
- Virtual file system management that unifies cloud space

GreyOS offers complete user space facilities (browser interactive):

- IPC (Inter Process Communication) / IMC (Inter Model Communication) in GreyOS
- Hardware Abstraction Layer (HAL) on top of the browser VM

There is also a complete toolset for the development of apps (cloud/browser interactive):

- A core API to build applications and interact with the OS
- Multi-threading & parallel programming framework

User space - system applications/services (cloud/browser interactive):

- Registry
- Task manager
- Window manager
- Multimedia manager
- Search
- Clock
- Other

You have to remember that GreyOS never “touches” any user hardware device. It runs on the cloud. A Meta-OS does not know what hardware is. Instead, the execution interface of GreyOS is the browser (browser VM or browser sandbox).

Therefore, to run GreyOS the user must have access to the cloud through a web browser. For that to happen, the user has to gain access on a device first.

There are two ways to do that:

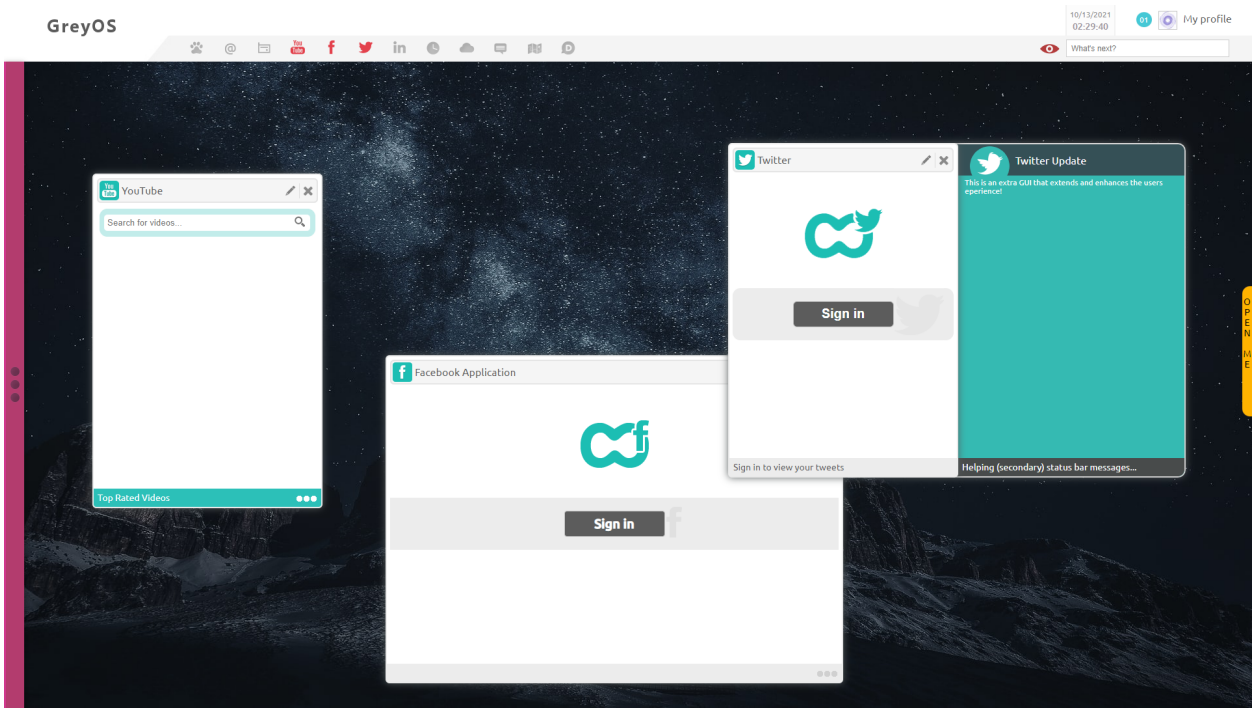
- Using a bootable USB drive with a traditional OS
- Booting a device that hosts a traditional OS

I call any traditional OS that bootstraps a device, a “Carrier-OS”.

Simply put, the Meta-OS (GreyOS) exposes services and apps inside the browser which in turn run on the device that hosts the Carrier-OS. The Carrier-OS is any operating system that bootstraps a device to the point where the user can interact with a browser and has access to the Internet. The same Carrier-OS also exists on any bootable USB drive.

A list of possible candidate Carrier-OS can (but not limited to) be:

- Android
- iOS
- Unix
- Linux
- Windows
- Custom OS
- A newly introduced OS



Development of GreyOS

GreyOS is under rigorous development and not even close to a finalized product. In fact, it is in an early alpha stage. If you wish to participate in the development of GreyOS, you are welcome to. We encourage programmers to code new features, integrate apps and share their ideas. After all, GreyOS is a free and open source OS.

If you are a hacker, a visionary programmer or just someone who finds GreyOS fascinating you can check the sources and other materials at https://github.com/g0d/GreyOS.

Finally, if you are just curious, you may just check the most recent working build of GreyOS online at https://greyos.gr/.

What about Google Chrome OS
Yeah, what about it?

Some people still find it difficult to distinguish between a Meta-OS (the only one that exists and I know of is GreyOS) and a cloud dashboard of apps. Chrome OS is just that. A set of Google products wrapped around a fancy marketing idea.

Practically, Chrome OS is part of yet another laptop with a pre-installed Gentoo Linux and lots of Google solutions on the desktop. You click a Google app, the browser opens and voila, you have the app running on the browser.

I mean that's fine, but this has nothing to do with an OS. The OS there is clearly Gentoo Linux!

But no worries there. In fact, most Google apps and software are a subset of GreyOS and can very well be part of its ecosystem. Personally speaking, I love Google solutions. Even this document has been written on Google Docs.

Supporters
Currently, all activities for GreyOS are supported by PROBOTEK. PROBOTEK utilizes GreyOS in certain cases and promotes its unique architecture for providing cutting edge solutions. PROBOTEK finds GreyOS rather interesting in the IoT, Robotics and Drone sector.

If you are an IT company with a view to the future or a high-tech investor looking for the next big thing, I welcome you to participate.

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