

Adoption Of ChromeOS & Cloud Platform

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## **Abstract**

This report defines what cloud computing is and explains the concepts behind Google's ChromeOS and the Chromebooks it is shipped on. It analyzes some of the benefits and drawback of moving to a cloud platform, and concludes that Welshire Partners should not adopt Chromebooks for its entire staff but rather should seek out cloud platforms that fit with its current level of employee-level technology, thus expanding it's IT infrastructure to the cloud but at the same time sticking with some of the current equipment.

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## **1.0 Introduction**

The purpose of this report is to outline the basics of cloud computing and technology, and also to analyze the benefits and drawbacks of cloud technology.

By explaining the basic concepts behind cloud computing and the concept of moving to a cloud platform, as well as looking at some companies that have transitioned to the cloud, this report makes a recommendation as to whether Welshire Partners should proceed with a transition to a cloud-based platform, and whether the firm should adopt Chromebooks (Google ChromeOS-based netbook computers) for the entire staff.

## **2.0 Definitions**

The following definitions cover the ideas of cloud computing and the Google ChromeOS platform.

### **2.1 Cloud computing**

Cloud computing is the model of computing that allows a client access to additional computing resources over the Internet. These resources could be processing power, or simply storage. Typically the cloud platform service providers allow resources to be scalable to a client's resource needs. Providers can delegate resources to multiple clients without the client necessarily knowing where (geographically) their computing resources are located (Mell, et al, 2011).

### **2.2 Chrome platform**

The Chrome platform (ChromeOS) is built upon the open source ChromiumOS and is very simplistic at its core. ChromeOS is shaped around the browser, though it also includes a media player for playing content offline. The rest of the device's storage and applications are kept online, in the cloud under Google's cloud services. All of the applications for the ChromeOS are web-based as well. ChromeOS is not available as a separate download; rather, it is only available preinstalled on a number of laptops built exclusively for the OS called Chromebooks (Chandler, 2010).

## **2.3 Chromebooks**

Chromebooks are laptops made by various vendors that are optimized to run ChromeOS. As the OS is built primarily with the web in mind, the Chromebooks are as well. Many have cellular 3G and/or LTE radios in addition to the standard Wi-Fi and (on some models) Ethernet capability.

## **2.4 Chromebook vendors**

There are many different vendors who sell Chromebooks. Buyers can choose to buy from Google or directly from the vendor. The current manufacturers of Chromebooks are LG, Samsung, Asus, Acer, Toshiba, HP, and Google.

## **3.0 ChromeOS vs. ChromiumOS**

ChromeOS and ChromiumOS share much in common, but they are also quite different. The subject of this report is ChromeOS.

ChromiumOS is an open-source project based off of the Linux kernel. It is for the most part a fully-fledged operating system, but it is maintained by the open-source community rather than by Google. The code can be seen or edited by anybody, and as a result ChromiumOS does not auto-update.

ChromeOS is a Google operating system based off of ChromiumOS. ChromeOS contains additional features that many consider integral to an operating system, such as verified boot and easy recovery. As mentioned in 2.2, ChromeOS is built to run only on certain optimized hardware (Chromebooks), unlike ChromiumOS, which can be run on almost any device that can have support implemented. Because ChromeOS is a Google product, it is maintained and updated by Google. In addition, because ChromeOS is not open-source, it is able to run certain packages that ChromiumOS cannot, including (but not limited to) packages enabling 3G cellular support, Adobe Flash, and Google Talk ("Chromium OS FAQ.").

## **4.0 Security Model of ChromeOS**

ChromeOS has a number of security features that an enterprise looks for in an operating system. Yet, there are still some concerns that need to be addressed.

### **4.1 Implemented standards**

Google's ChromeOS supports a good number of security standards that an operating system needs to have. Perhaps the most important of these features is VPN support. In addition, the OS supports data encryption, Secure Boot, Application blocking and whitelisting, user authentication, and remote administrator device management, including remote-wipe and user account disabling or suspending ("End User Devices Security Guidance: Chrome OS." 2014).

### **4.2 Causes for concern**

Despite the security features implemented in ChromeOS, there are some causes for concern. Though the OS supports VPNs and encryption, both are not Foundation Grade. Furthermore, the VPN can be disabled by the user, which means an accidental (or otherwise) deactivation could lead to a data leak. There is also no lockout mechanism for multiple incorrect passcode entries, which means that a brute-force passcode guessing attack could be successful and data could be compromised. There are no mechanisms that can prevent the toggling of system services such as Wi-Fi or Bluetooth, or blocking some USB devices (although USB storage device use can be disabled). And finally, the management of devices is entirely dependent on Google's online services, which means in the case of their service experiencing downtime, the system administrator(s) may not have complete access to user devices ("End User Devices Security Guidance: Chrome OS." 2014).

### **4.3 Addressing concerns**

To address some of these concerns the Government Digital Service recommends using a Walled Garden Architectural Pattern ("End User Devices Security Guidance: Chrome OS." 2014).

## **5.0 Benefits and Drawbacks of Moving to a Cloud Platform**

There are a number of advantages and disadvantages of making the transition to a cloud-based platform.

### **5.1 Benefits**

Firstly, the adoption of a cloud platform lets a business deal with running a business rather than having to deal with data centers, as these data centers are managed by a cloud service provider. Secondly, the use of PaaS (platform as a service) means that new applications can be developed much faster than local applications, as the backbone already exists on the particular server. Third, the automation of certain functions and workflows can be made much easier by adopting a cloud provider's API instead of writing from scratch, and finally, IaaS (Infrastructure as a service) allows almost infinite scalability to meet a business' needs as the business grows without having to bring in new equipment or technology and employees (Bauerle 2014).

### **5.2 Drawbacks**

There still exist several drawbacks to cloud computing and the cloud platform. Performance can vary, from consistent to unstable, especially if there is a lot of demand on a particular server or data center. Security can still be a problem for many businesses who do not take adequate steps to protect their information. Of course, a business can take the proper steps to ensure a secure configuration. And finally, the cloud may not be the right fit for a particular business or their needs. Not all infrastructural systems are equal, and it is up to the business to evaluate their needs and decide whether to make the change to a cloud-based system (Bauerle 2014).

## **6.0 Successful Cases of Cloud Migration**

There have been several successful cases of companies moving to a cloud platform, many of which are fairly large companies. One stand out is Netflix, who found that their data center was being overwhelmed by ever-increasing traffic and therefore turned to a cloud-based model in order to keep up with demand. Here, the scalability of the cloud is what prompted Netflix to adopt the platform. Apple is another great example, as they offload

the voice to text processing of their Siri personal assistant to the cloud. Because the entire Siri product exists almost entirely on the cloud, Apple can make changes and update the service without having to issue updates to consumer devices (Allouche 2013).

## **7.0 Casualties of Cloud Migration**

For every success story, there are naturally some cases where companies have failed to take their IT infrastructure to the cloud. In a recent study commissioned by cloud computing leader iLand Internet Solutions and conducted by Enterprise Management Associates Inc., 88% of respondents reported that they had faced at least one of six unexpected challenges involved in cloud computing. More than half of respondents who attempted to utilize Amazon Web Services or Rackspace, two common cloud service providers, reported that their adoption of the cloud platform had stalled or failed (“Casualties of the Cloud Wars” 2014).

## **8.0 Addressing the Needs of the Traders**

Porting the trading application to ChromeOS (or another cloud-based platform) would not be a simple task. However, one of the benefits of the cloud is SaaS (software as a service). If there is a non-proprietary option that can replace the current trading client, the company may save money in the long run by not having to redevelop or port the current application. If there is not a SaaS option, the cloud does make it easier to develop applications when compared to developing locally.

## **9.0 Different Options**

There are a couple different options to consider when it comes to making the transition to a cloud-based platform. The first would be the adoption of Chromebooks for all employees and the shift to the ChromeOS cloud-based platform. The other, perhaps more conservative option would be to adopt a cloud-based platform in the sense of migrating existing software and infrastructure to the cloud, but sticking with the existing employee computer options currently in place rather than moving to the Chromebooks.

## 10.0 Recommendation

The second option noted above is the ideal path to choose. Migrate some systems over to a cloud-based platform, but at the same time don't make the mistake of jumping on board of the ChromeOS train too soon. Instead utilize the existing technology but still give the infrastructure all of the benefits of the performance and scalability of the cloud. There are still components of ChromeOS that don't make it a viable option for enterprise just yet. The security features (or lack of) are still worrying and it would be preferable to use a different platform to bring this IT infrastructure to the cloud.

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