THE TRUE COST OF OPEN-SOURCE SOFTWARE

A WHITE PAPER

By Morgan Greene and India Sayer
Blueforce Development Corporation

SPOILER ALERT: IT ISN'T FREE

Open-source software (OSS) refers to software whose source code is freely available for anyone to view, modify, and distribute. Open-source software has gained popularity over the years due to its purported benefits. However, as with any technology, it presents challenges to consider prior to adoption.

One of the most touted benefits of open-source software is that it's "free". Organizations can download, use, and distribute OSS without paying licensing fees. Theoretically, this means that companies can save on software expenses and re-direct capital to other areas of the business or operation. Unfortunately, "there ain't no such thing as a free lunch." Companies and organizations that adopt open-source software must allocate budget to IT support, escalation costs, and software developer costs required to integrate, deploy, scale, and customize the open-source software for the organization's specific needs. These subsequent six-figure support and development bills often come as a shock to organizations who are attempting to just get their software up and running.

Advocates of open-source software will counter this critique by highlighting the advantage of community support available to OSS users. Open-source software typically has a strong user community that provides support, advice, and bug fixes. This community includes developers, users, and enthusiasts who are passionate about the software. However, it can be difficult to access support when needed as there is no 1-800-HELP-ME number to call! For national security, public safety, and first responder agencies requiring 24-7-365 capabilities, this is a nonstarter. These agencies will need to purchase support and development contracts to provide on call support. Again, open-source software isn't free!

Another consideration is the architecture of open-source software. At its best, OSS is highly customizable. Users have access to the source code and can modify it to suit their specific needs, resulting in increased efficiency and productivity. However, this customization can lead to increased complexity in the source code, making it harder to set up, configure, and use. Additionally, various code forks and bloat within the source code, combined with a lack of documentation and confusing user interfaces can stymie adoption and require further technical expertise. In some instances, this "virtuous" cycle of customization leads to accelerated hardware turnover and increased costs as more powerful chips, computers, and servers are required to run the platform.

Open-source software architecture can also create a lack of compatibility and scalability. OSS is often built or customized "in a vacuum" to address a specific use case without regard for integration. This results in incompatibility with other software applications. Furthermore, because it is typically developed for a spe-

cific use case, open-source software architecture is not built to scale to large organizations. This becomes especially true as not only the number of users grow, but also as the envisioned use cases expand. Finally, open-source software is not built for modularity and rapid adaptation. Supported APIs and SDKs are typically non-existent. While this can be true for commercial software as well, compatibility and scalability issues should be addressed during the contracting process. Selecting enterprise software built on open standards that demonstrates support for data and network interoperability is sure-fire way to mitigate the technical risk.

Linux is a prime example of the aforementioned discussion. Linux is a free and open-source operating system that was first developed by Linus Torvalds in 1991. It is distributed under the GNU General Public License (GPL), which allows anyone to use, modify, and distribute the software freely. This has led to the development of numerous versions, or distributions of Linux, each with its own set of features and applications. The growth, customization, and added complexity of its operating systems has incentivized several of the U.S.' largest tech companies to offer paid contracted support for Linux users. Some of the most prominent include:

♦ Red Hat: Red Hat is a leading provider of open-source software solutions, including the Red Hat Enterprise Linux distribution. They offer a range of services including technical support, training, consulting, and certification programs.

♦ IBM: IBM is a major player in the Linux market, offering a range of Linux support services to its customers. They provide technical support, training, and consulting services, as well as managed services and cloud solutions.

♦ Oracle: Oracle is known for its enterprise software solutions, including the Oracle Linux distribution. They offer a range support services including technical support, training, and consulting, as well as cloud solutions and managed services.

♦ Amazon Web Services (AWS): AWS is a cloud computing platform that offers a range of Linux-based services to its customers. They provide technical support, training, and consulting services, as well as managed services and cloud solutions.

There is clearly a large business case that has developed around an ostensibly free open-source operating system!

Or consider TAK (formerly known as Team Awareness Kit). TAK is a suite of software applications and protocols designed to provide situational awareness and communication capabilities to military, law enforcement, and emergency response teams. It was originally developed by the United States Department of Defense (DoD) and has since been open-sourced and made available for civilian use. The TAK suite includes several applications, including ATAK (Android Tactical Assault Kit) and WinTAK (Windows Tactical Assault Kit), as well as protocols for exchanging data and communications between different TAK-enabled devices. These applications allow users to share real-time data such as location, media, messages, access maps and other geospatial information.

Since its inception, TAK has grown to support users from military and law enforcement agencies around the world, including the US Army, US Marine Corps, US Air Force, and the Australian Defence Force. It is also used by civilian organizations such as search-and-rescue teams and emergency responders. The platform now supports over 20 of plug-ins on the civilian side alone. It's a safe bet that there at least that many plug-ins available on the military and government side as well.

2

At its core, TAK was not built to support a deployment of this size and scale. Last heard by a military user, TAK had fourteen (14) unique code forks making compatibility and integration both confusing and costly. (As a commercial software company, we haven't even been able to test our software compatibility with TAK due to its various flavors). Furthermore, TAK's plug-in architecture is not scalable. The "plug-ins" are baked into the core architecture, requiring the same libraries to run each time a plug-in is turned on. When using two plug-ins in TAK, the whole code base must be run twice instead of once. Three plug-ins? Three TAK instances running, and so on… Though it sounds innocuous, it consumes costly compute power. According to one organization that utilizes TAK, their mobile phones must be updated every 9-12 months to keep pace with the computing power needed to run TAK with their required feature set.

For the sake of comparison, consider an organization of 1,000 mobile users requiring 24-7-365 support. BlueforceTACTICAL software license for 1,000 users costs $310,955 annually (user + server license). Customer support, a single code base, constant innovation, and an ever expanding base of properly architected plugins is included in the cost of that license. Additionally, our software is designed to run on a wide variety of mobile devices, eliminating the need to undergo a large hardware update upon software adoption. Many of our customers continue to run our software on devices procured in 2019.

The TAK software license costs $0. However, if an organization requires 24-7-365 customer support, these services cost thousands of dollars annually. A simple internet search reveals that managed IT services including a help desk range from $125-$175 per user, per month. If one assumes TAK support is only a fraction of these support services, and substitute a conservative $25 per user per month, the total equals $300,000. This does not include any software developer costs. One contracted software developer at the median price of $53.08 per hour (US Bureau of Labor Statistics as of May 2020) for 40 hours per week, 52 weeks per year costs an additional $110,406. And we haven't begun to address server costs and potential hardware upgrades and churn.

True numbers vary by organization. For example, in DoD organizations much of the IT support is already internalized with headcount, or appropriated and allocated above the end user organization and across the force so that the full cost of ATAK support is not readily apparent nor easily discoverable. I tried to deduce this cost for a typical US Army Light Infantry Brigade, but quickly gave up due to opacity in the numbers and the fact that a true accounting is outside the scope of this paper.

In conclusion, this paper is not meant to be an indictment of open-source software in general, or Linux and TAK, specifically. It is meant to highlight objectively the fact that open-source software is definitively NOT FREE, despite claims to the contrary. Though it offers certain advantages, it also presents its share of challenges. An organization should thoroughly evaluate these benefits and drawbacks and consider the range of available options before blindly adopting open-source software based on price.

3