

Tertiary Effects of Portable Operating Environments

This article speculates on how portable (easy-to-carry), live, largely hardware-agnostic operating systems might change the computing landscape in the near future.

Table of contents

1 An Inflection Point?.....	2
1.1 The Thin Client Redefined.....	2
1.2 POEs (Portable Operating Environments).....	2
2 Adoption Drivers.....	3
2.1 Simplicity.....	3
2.2 Developments in Hardware.....	4
2.3 Privacy.....	4
2.4 Security.....	4
3 The Future Landscape.....	4
3.1 Computing Furniture.....	5
3.2 Form Factor.....	5

1. An Inflection Point?

Just as the web heralded the widespread use of *thin client* computing devices and services (mobile phones and Google are respective examples that come to mind), we argue here that portable OSs herald a complimentary tug in the opposite direction, towards safe, low-cost, easy-to-manage, personalized, *portable operating environments* (or **POEs**, for short). The driving force behind the adoption of this POE paradigm will be, paradoxically, simplicity.

1.1. The Thin Client Redefined

The thin client value proposition is that given *any computer* with some common programs and internet access, a user can get useful work done. A web-based email service is an example of a thin-client application. This view of "thin client" suggests a more simplistic definition of "thin client" for this article:

*A **thin client** is any computing device with a common set of programs and network access, capable of running web-based applications. A thin client does not depend on any locally persistent, user-specific data.*

Note:

Note here the emphasis on the lack of user-specificity. Also, our definition ignores the details of *where* the processing actually takes place (locally or on a remote server). This allows the playing of video, for example, to count as a thin client application. [See Wikipedia for more on this and other definitions of [thin client](#).]

Thus, from a practical standpoint, when you boil it down, whenever you use someone else's computer to check your web-based mail, you are using that computer as a thin client.

From the user's perspective, the advantage of thin client applications lies in their capability to be accessed from virtually anywhere using any computer. This is a huge win for the end-user, and a concept likely to stay for the foreseeable future. But this "thin client" principle is not, by itself, a cure all, end all. After all, if it were, we wouldn't all own *personal* computers.

1.2. POEs (Portable Operating Environments)

The POE value proposition is that given a personalized, live OS on a portable medium such as a USB key, a user can safely choose to do useful work on *any common PC* (with or without a network connection). This portable operating environment typically includes user-customized applications and configurations settings, and user-specific, locally stored data. Here's a crack at a definition:

A **POE** is the physically portable part of any 2-part client-side computing system consisting of

1. a portable media device containing user-specific data and a user-customized, live OS, and
2. a user-agnostic hardware platform on which this personalized, live OS is booted.

Note:

Technically, the computing system described in our definition can be considered a type of [diskless node](#).

The PC has been all about a personalized, customizable computing environment: the personalized, physical object owned by the typical user is the PC. When the POE usage model is adopted, however, the primary, personalized, physical object owned will be the POE itself (e.g. the USB key), not the PC (the box under the table) together with its peripherals (e.g. its screen).

2. Adoption Drivers

2.1. Simplicity

The physical decoupling of the POE (the portable media containing the live OS) from the hardware it runs on establishes a one-to-many relationship between the OS and hardware. Most of the simplifications discussed below arise from this fact.

- *For users who have both a desktop and a notebook*

Maintaining the fat client OSs on both computers typically involves some duplication of effort. Using a POE, only a single OS is maintained. From a usability standpoint, the physical and graphical representation of information (think of the shortcuts on the desktop) ought to be the same when you go from using the desk computer to using the notebook. Being able to pull the USB key out of the desktop and plug it into the notebook and continue work on that spreadsheet you were last working on, is an important feature of POEs.
- *Hardware replacement*

Buying a new computer no longer involves setting up the OS and all its applications. You check that the new computer in fact works with your POE before you leave the store.
- *Leave the notebook home*

A POE (e.g. a USB key) is much smaller than a notebook. If you know that a computer will be available to you at your destination, it might be a lot easier to carry that key than

carry the laptop.

- *Backup*

Backing up a POE is a lot easier than backing up a fat client. It involves saving a few images and overlays. Moreover, there is less to backup since each user has a single POE.

- *Lower cost of ownership*

Because of the aforementioned efficiencies.

2.2. Developments in Hardware

Advances in manufacturing technology and the inexorable downward spiral of hardware prices, increasingly point to a future with abundant, commoditized computing resources. Because the supply of volatile memory has outpaced the demand for memory by application software (the former has grown exponentially, while the latter has grown at a geometric rate), we are at a point where changes to the OS's file system can affordably be virtualized in-memory. (This is an important technical factor in current designs of POEs.) A similar exponential law governs the growth in capacity of (solid state) portable media. We are at a point now where a complete, live OS can fit on a USB key with plenty of room to spare. This confluence of hardware price points has made POEs both feasible and affordable on common, retail PCs.

2.3. Privacy

Some information simply doesn't belong on the network. Private information, if it is to remain truly private, should be stored on media you physically control. The very discovery of encrypted data on a shared server, for example, may be used against its owner or, worse, may be used to legally compel its owner to decode it. Which is perhaps one reason why the pure thin client never really caught on. You need to be able to save and read stuff locally: a feature inherently supported by POEs.

2.4. Security

A POE can be encrypted so that only its owner can access it. This encryption protects the owner's data at the file system level in case the POE is lost or stolen. The information needed to decode the media is not stored anywhere on the POE itself.

3. The Future Landscape

If, as we predict, the use of POEs becomes common place, then we can also expect an ecosystem to develop around its use. How that ecosystem will form is the subject of this speculative analysis.

3.1. Computing Furniture

Let's leave the workplace, and its IT overlords alone, for the moment, and consider the other every day objects we deal with. It is easy to imagine computing interfaces built into every car, arm rest, table, TV, fridge, toilet, wall, phone booth, diner booth, what have you, that let anyone work or play. As hardware gets cheaper, there will be more of the stuff around. But what about the cost of IT? the cost of managing and maintaining this plethora of computing devices? What happens when you buy that new TV screen? How do you hook that new TV into your home network? Will you have to hire IT consultants? Can you carry configuration settings (e.g. what TV shows to record) from one device to another? What happens if you move and you have to leave all this hardware behind? Will you have to piece together a new digital life by hitting the manuals in order to customize your new furniture to your needs?

The obvious answer to the last of those leading questions is "Of course not." A good piece of furniture fits its user; it doesn't make the user fit *it*. Computing furniture will allow users to run their POEs on them. This basic design principle allows a user to plug-and-play on any piece of furniture (hardware platform). The POE then becomes a personalized knowledge store of how to boot, configure and use most any device.

3.2. Form Factor

We mentioned the term *plug-and-play*. In fact, booting a POE will likely involve no physical *plugging* in whatsoever. Instead, the POE will boot wirelessly. This is already technically feasible. The actual storage medium on which the POE resides may itself be encased in another device, such as a mobile phone (which in turn allows booting a computer over bluetooth, for example). Thus, if wireless boots become the preferred method of booting POEs, the user-perceived form factor of the POE will vary depending on the physical device in which it is encased. But by the same logic, if a POE can be booted wirelessly, it must also be possible to make copies of it wirelessly. So the user's conception of a POE will be closer to that of a digital file than an actual computing device: more virtual than real.