State Department of Transportation
A Short Case Study

Introduction

This is another example of the unexpected cost of trying to use Xorg X servers, and graphics drivers from the graphics card/chip manufacturers for large and/or complex computer display systems. In this case, the DOT is one of the United States, with a population between four and five million. The engineer on a project to build and install automobile traffic display systems that would utilize nine monitors in a Single Logical Screen configuration (also known as Xinerama) and four video inputs from cameras monitoring traffic flow had attempted to make use of the Open Source availability of the X Window System SW. The OS was Linux, the platform was x86, and the graphics was Matrox G450MMS. The amount of time spent trying to get the system working satisfactorily by the time Xi Graphics was contacted was reported to be over eighteen (18) months. Two weeks later, using Accelerated-X™ Summit HX Series the first system was running smoothly with four video windows, and work had begun on assembling the next system. Just think. Eighteen months. Wasted.

Analysis and Comments

While it was a little surprising that the engineer would admit to having spent over eighteen months without being able to get satisfactory performance from his system, such cases are not all that unusual, except for the amount of time wasted in this case before contacting Xi Graphics.

The engineer was able to get the nine monitors - in a 3x3 configuration - working in Xinerama mode, but was able to have hardware acceleration on only one monitor. The other monitors had only what is called "FrameBuffer" mode, which is normal with Xorg, and is rather slow. As for video windows, he was unable to get even one working properly. Must have been a frustrating time for him, before finally contacting us.

So, what was "the problem"? The short answer is Xorg X servers, and graphics drivers that are written to mate up with them. But since this is the Education Corner, let's see if there are lessons to be learned.

First, why would an engineer (and his supervisor, and the manager of the supervisor, et al) allow such a situation to go on for so long? Think about it. And it is not just "government workers" that do this. Professionals, such as the SW engineers, staff, and managers in some of the best technically-capable firms do it. So the question is not who, but why.

One explanation may be that there are *some* systems that are just overly difficult to configure with Xorg, i.e., that most systems are no real problem. Doesn't wash. Two weeks after contacting Xi Graphics, the engineer had installed Accelerated-X SW, configured it, worked out the video windows hookups, and was buying a permanent license key from us for the system. It was not all that difficult a system when using good X sub-system SW. It probably took more time to get the requisition through Purchasing to buy the $750 license than it took for the system work.

Another explanation might be the engineer doing the job just didn't know enough about Linux and Xorg to do the job he was tasked to do. Doesn't wash. He knew enough to call Xi Graphics, and within a short time had his system up and running with full hardware accelerated views on all nine monitors, and had implemented four video windows that he could drag anywhere in the 3x3 array of monitors.

It should not be the case that every engineer who is trying to use Xorg X servers/drivers should be an X sub-system SW developer, and even if it were, that would not have prevented "the problem," since redesigning the Xorg stuff would taken longer. Besides, Management would not have opted for the use of such an approach.

The Xorg SW should be as easy to install and use as Accelerated-X, shouldn't it? It has had the same amount of time in the "market place" as Accelerated-X, and has had the "benefit" of many, many developers working on it, whereas Accelerated-X has had only a few developers over the years. With the large "Open Source Community" pitching in on the Xorg stuff, it should be awfully good by now, not just awful.

Second, why was Linux chosen as the preferred OS for such a system? Why not Solaris, Windows, or AIX? Ah, ha. Cost is probably the answer. AIX is only on IBM Power Series, and they are expensive boxes. Windows is "known" to be unstable, unpredictable, and costly. Solaris? Well Solaris is not free when one wants to use it in a business or organization such as a DOT. Linux is free. It is also Open Source, so that is better than just "free," isn't it?

If any problems surface, there is the Web for finding their solutions from the "Community." "From each according to his abilities; to each according to his needs," or something like that. In eighteen months, one would think the Community could have been more helpful, since this engineer clearly had some needs. Maybe he was able to get a lot of suggestions from the Community over the time period being considered. Maybe some actually seemed to help, at

least in some areas. So, when supervisors and management came around, there was activity, there was progress and optimism that things were "starting to come together," and so another few weeks would be allowed. After all, it is a Linux system, right? And we all know that Linux is the way to go, right?

Bingo! An Explanation?

Linux is the explanation. Linux is the cause of this fiasco. Here's why. Linux and Open Source are synonymous. And "everyone" "knows" that Open Source is the way to go. Can't go wrong. Mustn't use the "proprietary" "closed source" SW. That is such a waste of money - paying for something you can get for free. Why, that would be kinda irresponsible, wouldn't it? And we are (smart) responsible managers, right?

The hype over Open Source and Linux has only been rivaled by the hype that "Global Warming is man-made". Both are wildly wrong. And both are causing (or will cause, in the case of GW) considerable harm left unchecked, unchallenged.

As for Open Source, if it is so great, and the obvious way to go, why did it fail at DOT, as it so obviously did? There are countless other such stories, many of them seen by Xi Graphics when the engineers (or managers) throw in the towel and call us. Unfortunately, as in the case of DOT, by the time the call is made, much damage has already been done - to budgets, schedules, and/or "bottom lines." The cost of the solution is often less than the cost of a cheap monitor (or maybe two) for a large system, and peanuts for small ones.

There are probably many cases where Open Source does or can make sense. We know a few, and are contributors in some cases. Simple utilities, for example. Something one guy can wrap his arms around and handle while being a full-time college student. But please, just because a little bit of salt can add to the taste of a dish, don't believe that a barrel full will be useful. Xorg X servers and graphics drivers written to work with Xorg on Linux kernels are a barrel full of very complex, sophisticated SW.

Attempting to use Xorg "Community developed SW" is the underlying cause of many such situations as the one that occurred at DOT.   And, we believe, the problem was allowed to go on for so long because 1), the engineer "knew" that the SW was not at fault because so many people said it was working, and thus assumed that *he* was doing something wrong. So, if he just kept at it, he would finally discover what that something was and things would start working.

And 2), supervisors and managers in such situations are woefully ignorant of the SW monster

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that is "under the hood" of their computer system. Yet they should not be required to be fully vested with knowledge of all of the technicalities. Their expertise is not supposed to be in such esoteric, complex, and sophisticated SW as computer graphics sub-systems. It is managing the State's highways (in this case). Instead they rely on what they read or hear about the subject when considering how to go. And the Linux Open Source approach gets great reviews. No one seems to have a negative thing to say about it. The graphics card makers all "support Linux," usually with Open Source drivers for their cards. There are "lots" of Linux "experts" available as consultants, so how can we go wrong with Linux?

Well, let me name a few ways.

For openers, the Xorg developers are often college students who do not have formal training nor experience under the tutelage of supervisors who are knowledgeable in the art and science of the practice, or they are "hackers" who want to get their name on a list of "contributors," or engineers who can write good SW for things within their discipline - which does not include X sub-system SW. Even when a developer who is schooled and trained in the art and science of such SW contributes, their work/advice is often tossed aside by the "gatekeepers" who decide what gets put into the Xorg releases. So the SW is "less than optimal" to just downright abysmal in performance, stability, and maintainability.
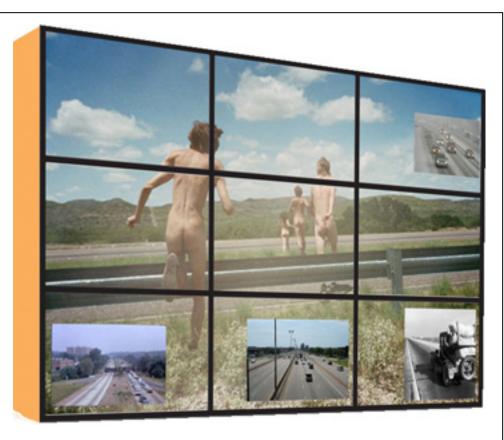
Then, when problems do occur, the belief in the communal approach seems to be a bit foolish. One would think that management would be a bit nervous relying on "someone," "out there on the Web," to have solved problems that might be encountered and would be willing in a timely fashion to donate their time to helping DOT. Yet, this reliance is often a factor in the ultimate decision. After all, the Hype says that is the way Open Source works.

Software that is as complex, sophisticated, and as large a body of work as X sub-system SW, is very difficult for software experts to manage. Sometimes even small chunks of SW that are not all that complex and sophisticated are difficult to manage even within a for-profit organization. So to believe that Xorg X servers and graphics drivers can be developed and managed by an ad hoc community of volunteers seems sheer folly.

The assumption that if Open Source is good for some utilities, it must be good for X is laughable. At least in the opinion of the folks at Xi Graphics, who do nothing but X high-performance X servers and hardware-accelerated graphics drivers for a living.

Our competition is the free Open Source stuff. Our customers are often companies (and individuals) who have blown a wad of time and money on Xorg (or XFree86) and turned to us "profit-mongers" for the "good stuff" and now won't go near Open Source X servers.

Accelerated-X is onboard Navy ships at sea, in hospitals and medical system, in Air Traffic Control systems around the World, in Railroad and Automobile Traffic Control systems in the USA and Europe, often in environments where SW failures can mean lives lost. Each system has been burdened (financially) because it has required a perpetual license be

A whimsical treatment of a nine-monitor SLS system with four XVideo links

purchased from Xi Graphics. And that burden has saved our customers money and time to market, and has earned them free maintenance support for years.

Contrast that with Open Source stuff which is free, doesn't work well and requires the "Linux Expert" for maintenance. Free to start, pay forever. Interesting, eh?

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Wm. Davis Jan 2008