Commercialization of PlanetLab: A Whitepaper

Larry Peterson
Princeton University

Status: Ongoing Draft.

Commercialization of PlanetLab: A Whitepaper

Larry Peterson

June 28, 2005

1 Introduction

One of the cornerstone goals of PlanetLab has been to provide an infrastructure that is both a research testbed (for short-term experiments) and a deployment platform (for long-running services). A natural question, which we have postponed answering up to this point, is how to accommodate the deployment of long-running *commercial* services. This whitepaper tries to address this question, and proposes a possible scenario for the commercialization of PlanetLab.

As a starting point, we take the position that supporting commercialization is consistent with the high-level goals of the PlanetLab Consortium. This is for the simple reason that any platform that hopes to influence the future evolution of the Internet will have to support commercial efforts. Moreover, such a position is not inconsistent with the goals of the research community that PlanetLab is designed to support, namely those that wish to address the problems faced by real-world network systems, and produce results that impact networks that people use.

While a commercialization effort is always always free to happen without the blessing or consent of the Consortium or its Steering Committee, there is value—certainly to the research community, but also to companies wishing to pursue commercialization—in encouraging and fostering the deployment of commercial services through the open and public infrastructure supported by the PlanetLab Consortium. Thus, this whitepaper focuses on the more narrow issue of how the PlanetLab Consortium should pursue commercialization.

2 Commercial Services

We recommend the following steps be taken to allow PlanetLab to host short-term experiments, long-running prototype services, and hardened commercial services:

- Modify the AUP to allow individual sites to allocate some fraction of their local node capcity to commercial services they wish to host.

1

- Extend the architecture to support such services by (1) hardening the resource isolation mechanisms so PlanetLab can make service guarantees to commercial services, and (2) providing mechanisms that allow sites to have a say in how their capacity is allocated.

- Codify the critical interfaces and protocols to support increasing decentralization. Specifically, we envision the need to support alternative implementations of the operating system (including the node manager), and multiple control centers (i.e., multiple PLCs).

- Solicit pilot commercial services, and use them as a driving force in making the necessary architectural, implementation, and policy changes.

While these steps have the potential to support commercial services on PlanetLab, there remains an important question of why a commercial enterprise would work with the PlanetLab Consortium (i.e., use "public" PlanetLab), as opposed to independently rolling their own proprietary PlanetLab-like infrastructure. We can think of three responses to this question.

- The public PlanetLab allows commercial enterprises to take advantage of an existing customer base, that is, the current users and sites.

- The commercial enterprise is interested in providing a service rather than the infrastructure that supports services. The public PlanetLab allows such companies to avoid building and maintaining the infrastructure, not to mention paying for bandwidth.

- It gives the commercial enterprise access to a ready-made research platform, which enables continued innovation. It also provides access to an active research community. Said another way, companies would be able to run non-commercial prototypes on the same platform as their for-profit version; the former can run on any node, while the later run only on those nodes whose owner "invites" them.

3 Commercial PlanetLab

Beyond commercial services, there is the possibility that a commercial enterprise will want to replicate PlanetLab itself, either for profit (i.e., to host services on behalf of other companies), or because it does not trust the public PlanetLab to provide a stable enough environment to support its own commercial service. If the motivation is profit, meaning that the entity is able to make a sound business

case for running a PlanetLab-like hosting service, then the only thing the public PlanetLab has to offer is the long-term benefit of participating in an effort based on open protocols and standards rather than proprietary technology. (It is probably more accurate to say that the likelihood of such an open system will convince a commercial enterprise that the proprietary route is unlikely to succeed in the long run, although a truly successful early player could probably dominate and define the space.)

We focus instead on the second motivation for creating a separate commercial PlanetLab, namely, as a means of doing a better job of supporting commercial services. This seems like the more likely scenario, if only because it is by first demonstrating commercial services on the existing public PlanetLab that companies are able to make a business case for deploying their own PlanetLab.

The primary response to this possibility is to note that there should be nothing in the architecture that limits how stable, secure, or performant the public PlanetLab can be. Certainly, the more succesful the public PlanetLab is at hosting commercial services, the higher the bar will be for a proprietary PlanetLab to do the same. Moreover, note that a public PlanetLab does not imply a purely academic exercise managed by a non-profit entity, any more than the public Internet implies a single NSF-funded backbone. In other words, the goal of the PlanetLab Consortium should be to define a set of protocols, interfaces, and best-practices that allow multiple commercial enterprises to offer a "commercial grade platform" *within* the public PlanetLab. We call these "PlanetLab Service Providers (PSPs)", drawing on the analogy of the public Internet in which multiple ISPs compete for users under the umbrella of a shared architecture, as opposed offering a propriatary network service as was once the case with SNA and DECNET. A multi-PSPs PlanetLab should be our ultimate objective.

4 Multiple PlanetLab Service Providers

Although impossible to predict with any confidence, we envision the steps outlined above will eventually lead to a public PlanetLab that spans multiple PSPs, as follows:

- One possible evolution toward for-profit PSPs involves companies spreading their services over both existing PlanetLab sites that elect to host the service, and their own strategically placed nodes around the world. Once doing this for their own services, commercial service providers could then sell excess capacity on their nodes to other service developers. It is through this process that a market for PSPs evolves.

3

- The most likely scenario for producing a pilot commercial services is to (i) target users at current PlanetLab sites (primarily universities) as early adopters of a service, and (ii) to attract content providers from the non-profit sector.

- As for-profit PSPs come into existence, there will likely continue to be a need for one or more "research PSPs" (analogous to Internet2) to support research. In an ideal world, for-profit PSPs would also contribute some fraction of their capacity to researchers, but there will likely continue to be a need for a federally funded research PSP.

- In the near term, companies will continue to join the Consortium, both to gain access to the existing infrastructure, and to participate in the evolution and definition of the public PlanetLab. Over time, for-profit PSPs will attract commercial developers, meaning that the main value of the Consortium will be as a place to define standards, and so on.

- One positive side-effect of current PlanetLab sites beginning to opt into (electing to host) commercial services is a lessening operations burden on PLC. This is because those sites will be motivated to keep their nodes up: their users are accessing (depending on) services that run on their nodes.

- The above scenarios seem to predict a public PlanetLab that spans multiple for-profit PSPs, one or more research PSPs, and nodes at individual sites that provide a local presense for those services that the site benefits by hosting. These per-site nodes might then run a combination of commercial services, research prototypes and experiments, and "free services" that provide useful functionality but for which no clear business model has emerged (or perhaps, they run these services for the public good).

- The preceeding discussion distinguishes between a public PlanetLab shaped by open standards and closed, proprietary PlanetLabs. There is also the possibility of private PlanetLabs that adhere to open standards, but are used exclusively within an organization; the PlanetLab equivalent of an intranet. Private PlanetLabs are certainly consistent with the Consortium's goals, and early indications suggest a likely scenario in the near future.

4