A Technical Strategy Report

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Introduction

This document summarizes recent discussions held among senior COs in the CS department concerning priorities for technical developments over the next year. Only areas requiring additional (or reduced) effort are discussed. Other ongoing activities which are expected to continue are documented in the activity figures and the project pages.

Summary

There was unanimous agreement that the following major areas required significant immediate attention:

- Windows NT awareness and management.
- System management infrastructure.
- Infrastructure performance.
- Efficient and reliable Linux support.
- Efficient and reliable database support.
- QI replacement.
- Winding down of Macintosh support.

A number of other application areas were also discussed, and these are itemized below. However, individual applications were considered less crucial than the underlying infrastructure.

Windows NT

Investigation of Windows NT was considered a high priority for several reasons, including:

- We believe that NT will be present in significant quantities in the department within the next few years, and *development of the necessary expertise will take several years*. It is crucial that we have sufficient knowledge and infrastructure to avoid a repeat of the current Macintosh situation where the linear nature of the support effort means that we are unable to provide useful support for more than a few machines.
- NT is already in use within the department in critical areas, including the hardware laboratory, the database server, and several research projects. There is a user-demand for more. These require support.
- Considerable effort is being wasted supporting existing NT systems because of the lack of knowledge within the department.
- Macintosh support is becoming increasingly unviable (see below) and we believe that NT offers the only foreseeable alternative. NT offers the only realistic possibility for providing several applications, such as MS Office and graphics for slides and the Web. This is likely to be the future standard OS for administration and portables requiring these applications.
- More third-party applications (eg. Autocad) are now moving away from Unix workstations towards NT as their primary platform.
- Many students (and staff?) will have NT machines at home, and we would like to support the use of home machines as a way of reducing pressure on departmental systems.
- The standardization on NT by other organizations, will make it a pre-requisite for compatibility and collaborative work. This is likely to be true for some University applications as well (eg. FIS).
- NT may provide the most appropriate platform for first year teaching, since desktop application software under Unix is woefully inadequate, and NT may provide a more suitable Java development environment.

Initially, we would like to increase our understanding of NT and learn to manage the systems using

some of the available standard tools. We would also like to evaluate the applications under NT with a view to using them as replacements for the Macintosh applications. Eventually, we would hope to incorporate NT into our system management procedures as they are developed.

System Management and Infrastructure

Despite the claims of manufacturers, large numbers of machines still require complex home-grown systems and procedures to manage in an efficient way. This is true for all large sites, and especially for academic environments where the systems are more diverse and evolve more rapidly. Several years ago, a considerable CO effort was devoted to developing a systems management infrastructure which enabled us to manage large numbers of Suns very efficiently. This was extremely successful and the department was acknowledged as a world-leader in providing an excellent environment for research and teaching.

During the last few years, there has been a reduced number of COs and an large increase in the variety of required support (Macintoshes, Linux, the WWW, databases, security, PCs, portables, etc.). It is this variety, rather than any increase in numbers which takes additional effort, and the development and maintenance of the infrastructure has virtually ceased. Support for Macintosh, NT and (to some extent) Linux, is considerably less efficient than the support for Suns (up to about ten times in some cases), and the department is losing its reputation as a world leader in systems support.This has produced a situation where the department may perceive a lower level of support in some areas, despite increased effort.

To reverse this situation requires a re-investment in the underlying system management infrastructure, and we would like to start investigating a redesign of several crucial areas, to take advantage of experience and new technologies, and to incorporate new difficulties, such as portable computing and diverse operating systems. This includes technologies for machine configuration, software distribution, and filesystems.

Some of this work is also a pre-requisite to any significant expansion, such as further integration across the IPU.

Infrastructure Performance

With the increase in performance of desktop machines, the implications for the servers and the network infrastructure are becoming more noticeable. We propose:

- Installing a new Mail server.
- Installing a new News server.
- Increasing the memory and re-structuring the Web server.
- Spending some time monitoring network activity to determine any possible problems or bottlenecks.
- Reviewing home directory and backup provision.

Linux

We believe that there will be a significant increase in the use of Linux as the preferred Unix for desktop machines. The reasons for this have already been well-documented, but include:

- More cost-effective hardware.
- Compatibility with home machines.
- Source availability.
- Dual-bootable machines (NT).
- Affordable Unix portables.

Our current Linux installation for CS2 is based on providing a restricted environment. To make Linux available more widely on the desktop (and satisfy the user-demand), we need to provide more flexible automated configuration and a much fuller environment.

Most of the problems here can only be solved effectively by tackling the general systems management infrastructure described above. Hence *we do not believe that we can support an increased population of Linux desktop machines until the systems infrastructure problems have been addressed*. Very little Linux-specific work is required.

Databases

For the first time, the department now has a database technology which should meet the

database requirements of most departmental applications. This is fully described in a separate paper, together with the student record application. However there are some dependencies that should be noted:

- The database server is based on NT and production-level support for this service requires a reasonable understanding of NT management.
- Any new systems-management tools may well require a reliable database as a core component.

We would also like to replace the QI directory with a real database. QI is being used well beyond the original application (a telephone directory) and is ill-understood, error-prone, and difficult to manage.

Macintosh Replacement

Unfortunately (at least for those of us who like their Macintoshes), it is increasingly hard to justify the use of these machines:

- The new OS (Rhapsody) has been repositioned as a server operating system and there are no plans to provide a desktop OS with memory protection. This means that there will be no improvement in the infuriating number of crashes and configuration problems.
- There will be no improvement in the managability of the OS, which means that it will still cost an order of magnitude more effort to manage than other systems.
- Future application support is uncertain.
- Support for our comparatively small number of Macintoshes is currently costing almost two full-time COs as well as an unquantified amount of academic staff time.
- MacOS runs only on a restricted range of (Apple) hardware.

To avoid attempting to support two operating systems simultaneously, we propose switching (supported) administrative and portable computing from Macintosh to NT in one move, if this still appears sensible once we have investigated NT in more detail.

Other Areas

Solaris 2.6

Solaris 2.6 provides support for NT and Macintosh filesystems as well as some other features which may save effort elsewhere and increase security. Solaris 2.6 is also an essential requirement, should we wish to purchase more modern Suns. We would like to investigate, and possibly implement, this as soon as possible.

Security

Security is still a growing concern. We still do not believe that the department understands the true lack of security in the department and the resources and decisions that are necessary to improve this.

Java

We are aware that there is no serious Java expertise within the CO team and we would like to develop this, since there is a growing demand, which would increase if/when Java is used for CS1 teaching.

Applications

We are conscious that several new applications would be very useful, and several existing applications badly need work. However, since these tend to have few dependencies, and represent new areas of work, it is often difficult to fit them into people's existing work.

- A network fax system.
- The "faults" program is running under an obsolete language and is very difficult to maintain. This needs significant work or possibly replacement.
- The door locks program is in a similar situation.