

Migration of the UNIX Application for eFAST CANDU Nuclear Power Plant Analyzer

Jae Seung Suh^a, Dae Seong Sohn^a, Sang Jae Kim^b and Gyoo Dong Jeun^c

a ENESYS, 337-2, Jangdae-dong, Yuseong, Daejeon, 305-308, Korea, jssuh@enesys.co.kr

b Korea Institute of Nuclear Safety., 19 Kusong-dong, Yuseong, Daejeon, 305-338, Korea, kimsj@kins.re.kr

c HanYang University, 17 Haengdang-dong, Seongdong, Seoul, 133-791, Korea, thlab@hanyang.ac.kr

1. Introduction

Since the mid 1980s, corporate data centers have been moving away from mainframes running dedicated operating systems to mini-computers, often using one or other of the myriad flavors of UNIX. At the same time, the users' experience of these systems has, in many cases, stayed the same, involving text-based interaction with dumb terminals or a terminal-emulation session on a Personal Computer. More recently, IT managers have questioned this approach, and have been looking at changes in the UNIX marketplace and the increasing expense of being tied in to single-vendor software and hardware solutions. The growth of Linux as a lightweight version of UNIX has fueled this interest, raising the number of organizations that are considering a migration to alternative platforms.

The various implementations of the UNIX operating system have served industry well, as witnessed by the very large base both of installed systems and large-scale applications installed on those systems. However, there are increasing signs of dissatisfaction with expensive, often proprietary solutions and a growing sense that perhaps the concept of "big iron" has had its day in the same way as it has for most of the mainframes of the type portrayed in 1970s science fiction films. One of the most extraordinary and unexpected successes of the Intel PC architecture is the extent to which this basic framework has been extended to encompass very large server and data center environments. Large-scale hosting companies are now offering enterprise level services to multiple client companies at availability levels of over 99.99 percent on what are simply racks of relatively cheap PCs. Technologies such as clustering, Network Load Balancing, and Component Load Balancing enable the personal computer to take on and match the levels of throughput, availability, and reliability of all but the most expensive "big iron" solutions and the supercomputers.

2. Why Move from UNIX Application

So what reasons are driving us to consider moving from our cozy UNIX environment that has served us so faithfully all these years? Perhaps because we have the following goals:

- Reducing costs
- Increasing flexibility

- Improving performance

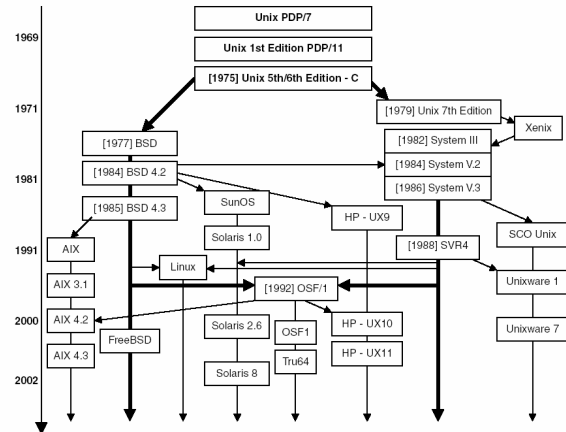


Figure 1. The history of UNIX implementations

Reducing Costs

For most organizations, information technology is a business enabler and a means to greater productivity, rather than a revenue generator. For this reason, IT services are a cost to the business and, like any other cost, need to deliver the highest possible levels of business value. When assessing IT costs, we are likely to be looking beyond just the initial cost of acquisition to the total costs over a 5, 10, or 15 year life cycle, incorporating training, support, and maintenance costs into the equation. Therefore, when considering costs, we are likely to be looking for a solution that provides lower total cost of ownership, rather than the fact that, say, the operating system is free.

Increasing Flexibility

In the current shrinking economy, businesses have to be more flexible and able to react faster to remain competitive. Increasingly, it is the organization that can turn more sharply and realign itself to its clients' needs fastest that wins the business. If we can provide the best infrastructure that lets our engineers, analysts, or scientists work to their fullest potential, then we are giving our organization the competitive edge that it needs to survive and thrive.

Improving Performance

Increasingly, applications such as computer aided engineering, risk analysis, and 3-D modeling and rendering are becoming mainstream tools, thus putting greater and greater demands on our computing

infrastructure. We need to ensure that our equipment can scale effectively and provide the price-to-performance ratios so that we can give our organization's employees the horsepower that they need to carry out their jobs efficiently.

3. Migration Strategy

To determine the objectives of the application that you want to migrate from UNIX to Windows, we need an in-depth understanding of the application, how it is used, and its infrastructure and support environment. During this first part of the assessment, we gather all of the business, technical, operational, and other information that can help us determine the appropriate application-migration approach and make decisions during the migration process. The following sources can provide information that will help us understand the objectives of the migration:

- The application
- The application's documentation
- The current infrastructure
- The development environment
- The user base

The information you collect from these sources will allow you to develop a migration strategy, as shown in Figure 2.

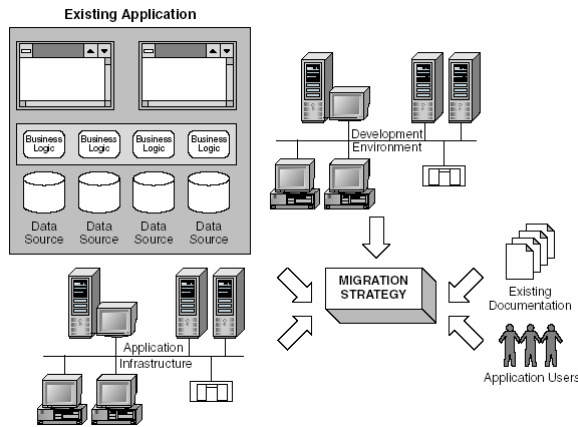


Figure 2. The migration strategy

The process of migrating UNIX software to Windows is sometimes perceived to be a long, expensive undertaking because of incompatibilities between the two operating systems. However, application migration from UNIX to Windows is feasible. To migrate an application from UNIX to Windows, we must consider the platform differences, the differences between the application's implementation on each platform, and the features of the deployment and management tools available for each operating environment. Therefore, any application migration from UNIX to Windows requires a thorough assessment of the application to be migrated,

followed by an analysis to determine the most appropriate migration approach.

4. Migration for eFAST CANDU

In eFAST CANDU project, we migrate from a UNIX-based user interface to a Windows user interface. The main user interface type in use on the UNIX platform today builds on the X Windows set of standards, protocols, and libraries. Because the overwhelming majority of UNIX graphical interfaces are built on X Windows and Motif, this paper focuses on porting code from X Windows to the MS Windows operating system.

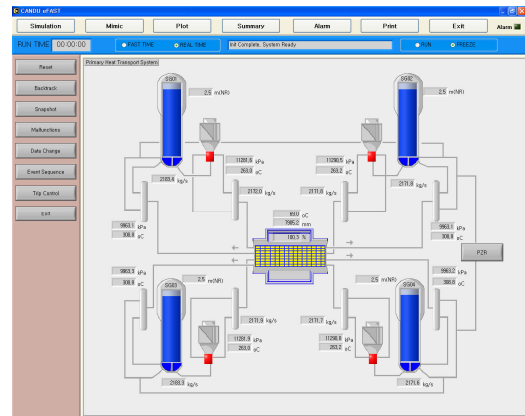


Figure 3. Windows based Graphic User Interface with LabView system for eFAST CANDU

5. Conclusion

This paper provides detailed descriptions of the migration of the eFAST UNIX version for CANDU reactor. And then, we have some understanding of the concepts behind UNIX-to-Windows migration. We looked at the main factors behind considering a move from our current UNIX environment and the twin options of migrating to Linux or to Windows. We reviewed the advantages and disadvantages of each approach. Through the verification and validation of the PC based eFAST CANDU, it was demonstrated that the eFAST can realistically simulate the plant behaviors during transient and accident conditions.

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