

Designing Enterprise Operating System with PRINCE2 Framework

S. Rohollah Moosavi Tayebi

Computer Engineering Department
Shahr-e-Qods Branch
Islamic Azad University, Tehran, Iran
moosavi_tayebi@yahoo.com

S. Shervin Ostadzadeh

Computer Engineering Department
Science & Research Branch
Islamic Azad University, Tehran, Iran
ostadzadeh@srbiau.ac.ir

Samaneh Mazaheri

Computer Science Department
University of Tehran
Tehran, Iran
mazaheri.samaneh@yahoo.com

Abstract - Substantially, the operating system (OS) is most important entity in the typical information-driven organization. Sometimes, some organizations want to design and develop it themselves. Reason of this, may be has some parameters like security, controllable, manageable and etc. An OS cannot be an island unto itself; it must work with the rest of the enterprise. On the other word, enterprise wide applications require an Enterprise Operating System (EOS). Enterprise Architecture (EA) has proven to be the best option for development and maintenance of enterprise operating systems. In this respect, EOS Framework has been widely accepted as a standard scheme for identifying and organizing descriptive representations that have prominent roles in enterprise-wide OS development. Moreover, there is a remarkable need for IT projects management. In this respect, PRINCE2 has been best option for software project management. So, in this paper, we intend to use PRINCE2 to manage stages of enterprise operating systems base on EOS Framework. The suggested model helps developers to design operating systems more effective and efficient.

Index Terms: Enterprise Operating System (EOS), PRINCE2, Software architecture, software project management, Modeling.

I. INTRODUCTION

Fundamentally, an enterprise operating system is the center of IT activities in an enterprise. It manages all resources; connects all devices; and provides a virtual platform for enterprise services. So, development of such projects is very important. Since develop of these projects are based on the team work, a centralized and coherent management is quite essential [1]. In the year 2004, 13522 projects were considered and analyzed in the IT field by the Standish Group. The results revealed that only one-third of those projects had managed to achieve their objectives. The most important reason for such deficiencies is lack of an IT project management framework [2]. To solve this problem, various project management frameworks have emerged, such as, PRINCE2 and PMBOK. PRINCE2 is often referenced as a standard approach for software project management [3]. In this paper an attempt is made to design EOS with PRINCE2 framework and propose a method for EOS development. This is the first time that a management framework is proposed for developing an enterprise operating system.

The rest of this paper is organized as follows. In Section 2, we introduce some basic concepts and principles. We schematically study the EOS framework in section 3. In section 4 the proposed solution for Designing EOS with PRINCE2 is explained. In section 5 the concluding remarks and suggestions for future works are said.

II. BASIC CONCEPTS

In this section we briefly introduce some basic concepts and principles. We believe these remarks can help readers to clearly understand what we mean by the concepts used in the paper.

A. Software project management in PRINCE2

PRINCE2 is a set of project management standards that were originally sponsored by the central computing and telecommunication agency (CCTA) for use on British government ICT projects. The standards are now also widely used on non-government projects in the United Kingdom and being more powerful than often management frameworks such as PMBOK, it is used as a proper management field and as a supplement to PMBOK as to manage the IT projects [5]. PRINCE2 framework consists of three main elements, processes, components and techniques [6].

In the following, 8 main processes of this issue are briefly mentioned:

a) *Directing a project*: All the projects shall be controlled by a senior manager to survive. The body presented by the senior manager is called the Project Board, in which processes such as starting up a project, presentation a line of management and closing a project.

b) *Starting up a project*: This process takes place before the formal start of the project. It consists of project recognition assurance of projects existence of pre requirements such as structure, competent work force, documents and etc in the project environment. In fact, in this process the executive manager with the assistance of the project manager, defines the goals and proposes the way to achieve them.

c) *Initiating the project*: This process consists of the basic plan and proposes a precise definition for the expenses and financial issues.

d) *Planning*: Planning specifies the method of the plans arrangement in different phased of a project and

defines the outgoing products. Activities timing and risk analysis are the essential steps towards products such as expense and time planning process in PRINCE2, gives these activities a logical and practical pace.

e) *Managing Stage Boundaries*: In the process, the senior manager receives the key points of decision making to become able to examine the project permanence from the financial point of view.

f) *Controlling a stage*: In PRINCE2, project is divided into manageable smaller segments, in this way project controllability is being, insured. The number of segments depends on the size, complexity and risk level of the project. Each level should be completed before a new level begins.

g) *Managing product delivery*: This process concentrates on allocation of activities to team members and also on product delivery. The products can be divided into two groups of physical entities and invisible products. Every product passes a quality control procedure in PRINCE2. Suppliers usually do the essential activities for products delivery. The project manager should guarantee that the products are delivered at the proper time. The report the project manager receives may also confirm the quality control process.

h) *Closing a project*: A project is closed when it has delivered all of its products; at this stage a long the final report is produced as the sources are released. In this report, project achievements which were stated in the primary plan as the project goals, the occurred problems and the points learnt in such situations and also guidelines to avoid such problems are stated [4].

B. Enterprise Architecture (EA)

Enterprise architecture is the science of designing an enterprise in order to rationalize its activities and organization. EA shows the primary components of an enterprise and depicts how these components interact with or relate to each other [7]. EA typically encompasses an overview of the entire information system in an enterprise; including the software [10], hardware, and information architectures. In this sense, the EA is a meta-architecture. In summary, EA contains views of an enterprise, including work, function, process, and information, it is at the highest level in the architecture pyramid. For details refer to [8].

C. Enterprise Operating System Architecture

Enterprise Operating System Architecture is a view of the operating system used by an enterprise to accomplish its duty. It contains descriptions of various operating system layers integrated with other enterprise architecture views [9].

III. EOS FRAMEWORK

In this section, we introduce EOS framework as described in [9]. Figure 1 depicts the EOS framework schema. It is a two dimensions matrix. The columns are

based on six basic interrogatives that are asked to understand an entity. The columns include:

- **Data (What is it made of?)**: This focuses on the material composition of the information. In the case of EOS, it focuses on data that can be used for operating system.
- **Function (How does it work?)**: This focuses on the functions or transformations of the information used for operating system.
- **Network (Where are the elements?)**: This focuses on the geometry or connectivity of the data used for operating system.
- **People (Who do what work?)**: This focuses on the actors and the manuals and the operating instructions or models one uses to perform their services.
- **Time (When do things happen?)**: This focuses on the life cycles, timings, and schedules used for operating system.
- **Motivation (Why do things happen?)**: This focuses on goals, plans, and rules that prescribe policies and ends that guide an organization for operating system.

The rows represent various perspectives of the OS framework. These perspectives, starting from the top, are:

- **Scope**: This is the highest level of abstraction in the framework. It refers to the boundaries of the enterprise from the operating systems view. This row is the perspective of chief enterprise's managers.
- **Services**: This row stands beneath the Scope layer. In this row, the services that the operating system should provide in the enterprise will be addressed. This is the perspective of an enterprise's expertise.
- **Kernel**: This row stands below the services, and focuses on operating system behaviors to support operating system services. This is the perspective of the operating system development team.
- **Core**: This is the lowest level of abstraction in the framework. It focuses on basic management that an operating system should provide to support kernel layer. This row is the perspective of system programmers.

The framework contains 24 cells. Each cell describes a model that an organization might document to describe the enterprise operating system. Each of the cells in the framework is primitive and thus, each can be described or modeled independently. All of the cells on a given row make up a given perspective. All of the cells in a column are related to each other since they focus on the same type of elements.

Organizations may not keep all of the models described by the EOS framework. Some organizations do not formally define some of the cells; however, since all of the cells are logically necessary for a complete description of an organization, if they aren't formally described, they are implicit in assumptions made by people in the organization. You can find the framework's cells definitions in [9].

IV. THE PROPOSED SOLUTION FOR DESIGNING EOS WITH PRINCE2

In this section the main subject of this paper is probed: Proposing a framework of EOS development with the purpose of Enterprise IT project management in a controlled environment.

As mentioned before, the purpose of this strengthening is to use PRINCE2 to manage stages of enterprise operating systems. In this model, EOS Framework and PRINCE2 could be considered as a complement to each other for EOS development. EOS Framework focuses on software life cycle including analysis, designing, implementation, deployment, maintenance, evaluation, integration and totally the software architecture, while PRINCE2 focuses on the controlled and structured initiation and closing of the project.

Figure 1 illustrates the proposed model for EOS development.

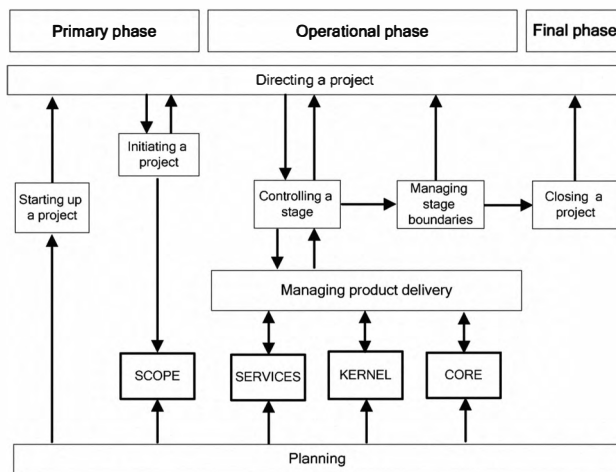


Figure 1. The correspondence in PRINCE2 and EOS Framework stages.

The proposed solution shall carry some specifications:

1) It should be standard. 2) It should be based on the two principles of project management and software development. 3) It could be integrated. 4) It should be controllable.

In the following, the proposed model is presented and then it will be evaluated concerning the above said specifications. In figure 1, there are three major phases are proposed: 1) the primary phase, 2) the operational phase and 3) the final phase. The primary phase is independent from implementation and consists of the stages of starting up and initiating. In these stages the EOS scope (namely SCOPE) is detected and its objectives are defined and stipulated. In this section the EOS primary plan should be proposed in which the major requirements and limitations of the EOS are acquired and restored in the Project Brief. Finally the decision about its abortion or resumption should be taken. On the other hand, this stage focuses on the system requirements and doesn't show the details of EOS structure. In this phase the fundamental and primary risks of this project are also identified.

The major activities in this phase are as follows:

- Objective definition

- Feasibility study
- Primary plan proposal
- Product definition and analysis
- Cost and time estimation

The second phase, namely the operational phase, integrates the PRINCE2 stages and the three major stages in EOS development process. PRINCE2 activities manage the product presentation and exercise collaborative controls on the project managers and EOS developers. The SERVICES handle the services that the operating system should provide. KERNEL focuses on operating system behavior to support operating system services and it is the perspective of the operating system development team. CORE focuses on basic management that an operating system should provide to support KERNEL. This stage is the perspective of system programmers. Project planning is mainly started in this phase. In fact, in this phase the activities recognized in the previous phase should be confirmed and each activity should begin with its specific time schedule and receive the necessary resources based on the management supervisor policies in order to produce their products in the proper time and under the approved budget.

The major activities in this phase are as follows:

- Definition and validation of the architecture
- Assigning the activities to team members
- Assurance that the activities will be done
- Assurance of the product quality level
- EOS implementation
- Project result visualization
- Report delivery

In the third phase, namely the final phase, implementation is completed and it should be insured that all the vague points are clarified. In fact, in this phase the project deficiencies shall be resolved or defined as the later activities.

All of the requirements of the customer shall be met and the system maintenance and support option shall be produced. All of these activities should be confirmed by the chief enterprise's managers.

The major activities of this phase are as follows:

- Project classifying
- Producing the final report
- Identifying the deficiencies and difficulties to set the future activities
- Producing the Post Project plan.

V. CONCLUDING REMARKS

As mentioned before, the EOS is considered as the center of IT in an enterprise provided a virtual platform for enterprise services. In this paper, we propose a solution for developing EOS in a controlled environment. Due to constraints and management requirements of EOS development, it is recommended that use PRINCE2 as management framework. In this way, project management processes in cooperation with EOS development processes, lead this project in the proper way. Obviously, an integrated model such as the proposed one, along with the essential knowledge and training can be the best mean of EOS development. In general, our proposed method is

expected to increase the success rate of such projects in enterprises.

REFERENCES

- [1] L.J. Kirsch, "Software Project Management", An integrated perspective for an emerging paradigm.
- [2] B.Hughes and M.Cotterel, "Software Project Management, Fourth Edition, School of Information Management, University of Brighton, 2005.
- [3] S. Rohollah Moosavi Tayebi, S. Shervin Ostadzadeh, Samaneh Mazaheri, "Employing MDA in PRINCE2 Framework", IEEE International Conference on FUTURE INFORMATION TECHNOLOGY and MANAGEMENT ENGINEERING (FITME 2009), 13-14 Dec 2009 pp. 22-25. (ISBN-13 978-0-7695-3880-8).
- [4] S. Rohollah Moosvai Tayebi, Maryam Rahmani, "A model for Software Project Management based on PRINCE2 Management Framework and RUP Methodology", Proceedings of the 13th National CSI Computer Conference (CSICC'08), March 2008
- [5] C. Bentley, "Practical PRINCE2", The Stationery Office, 2004.
- [6] CCTA, "Managing Successful Projects with Prince2", The Stationery Office, 2004.
- [7] J. A. Zachman, "A Framework for Information Systems Architecture," IBM Systems Journal, Vol. 26, No. 3, 1987.
- [8] C.M. Pereira, and P. Sousa, "Enterprise Architectures: Business and IT Alignment," Proceedings of the 2005 ACM symposium on Applied computing, Santa fe, New Mexico, 2005.
- [9] S. Shervin Ostadzadeh and Amir Masoud Rahmani, "A Framework for Enterprise Operating Systems Based on Zachman Framework," Advances in Computer and Information Sciences and Engineering, Springer, July 2010. (ISBN 978-90-481-9111-6)
- [10] L. Bass, P. Clements, and R. Kazman, "Software Architecture in Practice, 2nd Edition, Addison-Wesley, 2004.