

Research on the Intelligent Information Processing Algorithm of Virtual Enterprise

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Abstract. Under the trend of economic globalization and rapid development of information technologies, the production management mode of enterprises is changing dramatically. Meanwhile, traditional enterprise production management mode cannot be unable to adapt to the changing market environment. This paper studies on the network architecture as well as flow calculation of a new enterprise mode-virtual enterprise. This paper aims to perfect the network architecture and establish a mathematic model which can calculate the network flow. From the perspective of stochastic programming, this paper adopts chance constrained programming to establish a mathematic model which can calculate the network flow and meanwhile comes up with the idea to use genetic algorithm to simplify the calculation process. Finally, this paper analyze the flow calculation and networking on virtual enterprises based on a real case, which can provide theoretical references for the feasible operation of enterprise network.

Introduction

Virtual enterprise also known as dynamic alliance is born along with the more fierce competition environment and gradually maturing global information wave. It is a totally new concept, and its emergence indicates that a new relation among enterprises shall become worldwide trend, which is not simply cutthroat competition and is different from fixed group companies. Virtual enterprises do not have walls, which go beyond geography and take advantage of modern communication technology and computers.

When virtual enterprises catch the opportunity product, there should be a sound external environment as well as information technology as support so as to make them operate with high efficiency. However, information safety has become a global difficult problem which will affect the network development and all applications should be built based on relatively safe environment. Along with the expansion of network application, new problems will come one after another. Therefore, in order to safeguard the consistency between virtual network and reality, it is urgent to enact legislation.

This paper combines the characteristics of Chinese enterprises, expecting to perfect the organizational model and architecture. Besides, this paper starts from general network flow to analyze the flow calculation of virtual enterprises, which is significant for Chinese enterprise management model.

Network Architecture of Virtual Enterprises

With the soaring of application demand and client numbers, C/S model is facing problems which are difficult to deal with, showing in three aspects: increasing cost, scattered data and difficult controlling as well as system maintaining. To conclude, in order to solve the network problems, two problems should be taken into consideration: from the macro perspective, it is the problem of architecture and information integration; from the micro perspective perspective, it is the flow calculation.

Based on the concrete analysis on the current resources as well as application requirement of large and middle-scale enterprises, this paper comes up with the idea to take WWW technology as the basis to carry out a general plan and implementation scheme for the above enterprises with Chinese characteristics and suggests a architecture which integrates C/S and B/S virtual enterprise

information system. The hardware environment for virtual enterprise include intranet, extranet, firewall, which takes advantage of network public access and technologies (TCP/IP,web, VPN) to compose a virtual enterprise calculation environment.

In an enterprise information system, some business functions adopt B/S model while some adopt C/S model. Therefore, this paper comes up with an architecture integrating C/S and B/S, namely B-C-S model.

Mathematic Modeling of Network Flow Calculation

In the course of acquiring information and carrying out data transmission, there will be non-uniform calculation of data flow because of network structure as well as characteristics of different departments, as a result, there will be data congestion which will affect the normal transmission of data. In order to solve this question, we have to take into account the following two aspects: the first is to calculate the network data flow and adjust the architecture so as to achieve reasonable calculation; the second is to choose a subnetwork based on the flow of department.

Chance constraint plan is random, which is made before the realization of chance variable. A meaningful random plan is the following chance-constrained programming model (CCP):

$$\begin{cases} \max & f \\ \text{s.t.} & \\ & P \{ (x, \xi) \geq f \geq \beta \} \\ & P \{ g_j(x, \xi) \leq 0, j = 1, 2, \dots, p \} \geq \alpha \end{cases}$$

Among which, $\Pr\{ \}$ refers to the event establishment proportion, while α and β refer to the given constraint condition and confidence level of object function.

A more general case is to adopt hybrid chance-constraint.

$$\begin{cases} P \{ g_j(x, \xi) \leq 0, j = 1, 2, \dots, k_1 \} \geq \alpha_1 \\ P \{ g_j(x, \xi) \leq 0, j = k_1 + 1, k_1 + 2, \dots, k_2 \} \geq \alpha_2 \\ P \{ g_j(x, \xi) \leq 0, j = k_{t-1} + 1, k_{t-1} + 2, \dots, p \} \geq \alpha \end{cases}$$

Among which, $1 \leq k_1 \leq k_2 \leq \dots \leq k_{t-1} < p$

Among which, we suppose α_i and β_i , which represent state and random data flow.

Network flow calculation and network design case for virtual enterprise

We can see how many departments do an enterprise have and how many close partners do they have in figure the network structure decomposition model demonstration:

Fig. 1 Network structure decomposition model demonstration for a certain virtual enterprise

In the picture, the center node is assigned, which is not the only one and its relative abstract model is shown in Fig .2:

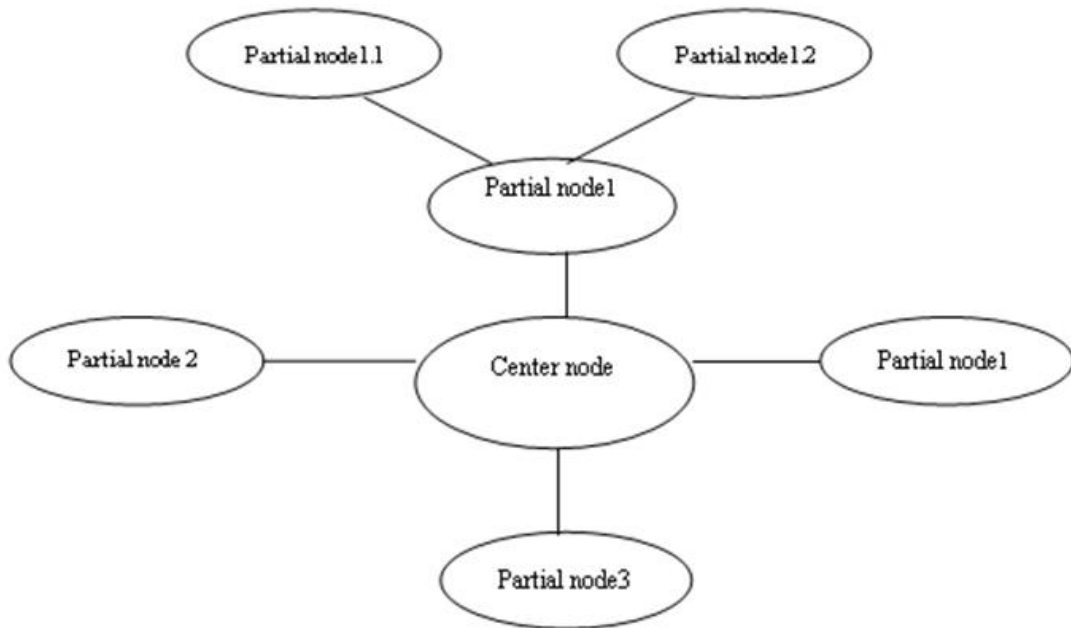


Figure 1 Network structure decomposition model demonstration for a certain virtual enterprise

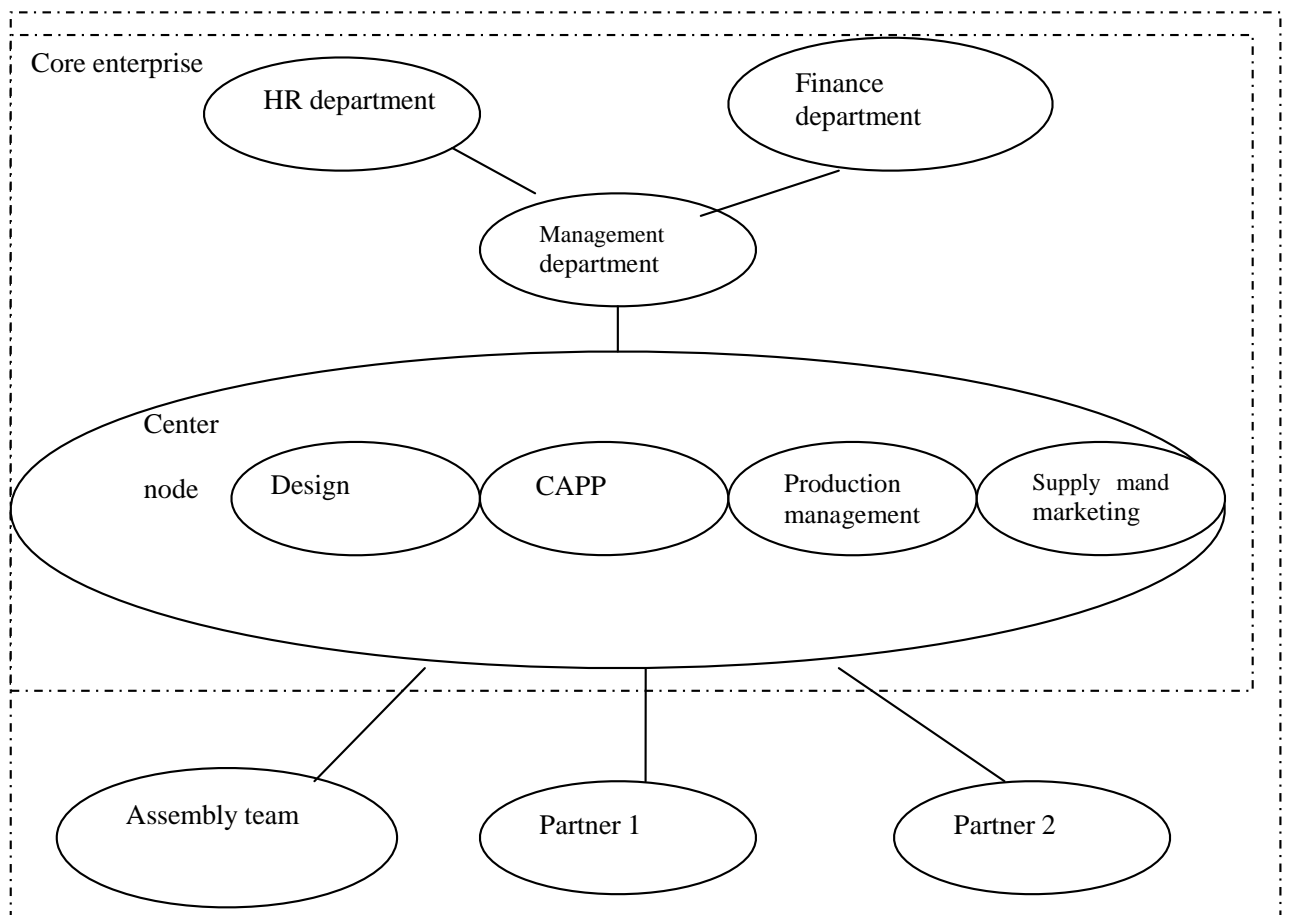


Figure 2 Network architecture abstract model

An enterprise has many departments and they carry out data exchanges. In order to carry out quantitative analysis on exchanging data, we can adopt object analysis and other calculation methods to conduct a comprehensive analysis on the departments so as to have a knowledge of size of exchanging data.

Conclusion

The framework of virtual enterprise is the basis to guarantee the normal operation which should develop along with the development of computer network technology. This paper starts from the development trend of virtual enterprise theory research and real requirement of enterprise manufacturing management, which studies on the network architecture of virtual enterprise and its flow calculation so as to provide theoretical guidance for enterprises to implement virtual manufacturing. By describing the network architecture of virtual enterprise, this paper establishes a network environment, which should not only take the current situation but also the situation in the future into consideration. The study on this perspective is not enough which needs deeper exploration. Besides, research on the network flow of virtual enterprises is not complete, while its application should be thoroughly studied.

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