GENERAL SCHEME OF VISUAL PRESENTATION WITH ACCOUNT OF PARALLEL DATA PROCESSING

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A structure of graphic visualization systems was researched. A model, showing up foundational information relations between system elements, is suggested. Several model schemes were analyzed.

Introduction

Nowadays systems of visual presentation (SVP) are actively widening their influence on different spheres of people's activity. Moreover, in contemporary conditions of work of such systems a tendency to increasing volume of processing data and complexity of its analysis is emphasised. That's why when engineering SVP, a component of parallel data processing should be taken into consideration as necessary and be researched as *of current interest.*

An object of mathematic description of a structure of pointed media is considered in the work. The worked-out model of a system admits processing data with technologies of parallel computing, without a demand of conceptual changes in central blocks.

Assumption. Building models without orientation at specific subject field, claiming for universal schemes, promotes *separating new and researching known properties of SVP*, it also provides basis for new system development, which is the *aim* of the work.

Analysis of SVP structure

Having considered variety of 3D display systems, we separate three objects, the presence of which is necessary and functioning is most important. The forth object, fulfilling the possibility of parallel computing is also included in the list of the necessary ones. Let's mark that the obligatory including of parallel component into SVP model is not practically a rule, it's rather a relative research novelty, sustained by the studied tendencies of the field.

So, speaking software language, the separated objects represent the following:

Terminal for entering user's commands, choice of accessible actions over the system. It serves as interface to fulfill basic *user's tasks:* download of new data, indication of necessary characteristics. Let's mark, that such inherent tasks as analysis and result interpretation are already beyond the model's framework;

Interface for data exchange with *Data base management system* or *special format file set.* Graphic data processing is also done here;

Program, giving opportunity of parallel and distribute computing by fixed protocols (mechanisms) such as MPI and etc.;

Rendering tool – is a program set, fulfilling *tasks of preparing and monitor displaying* of the necessary information. First of all the set consists of program codes of the selected methods of engineering from incoming – for the object – data of 3D information display with desired conditions.

So we have four principally different (from the functional point of view) data flows. In diagram form we can imagine them as rays, aiming to unite to fulfill tasks, and that predetermines separation of *central part* in a model, different from the named objects.

Projecting the separated regularities of intersystem parallel computing work at SVP system with parallel data computing we come to separating model's finite structures.

The proposed schemes

In the process of further analysis we come to three possible model schemes.

Scheme 1. Each of the four objects coordinates directly with only one of the special modules (SM), being part of system's kernel. In these program interfaces data and managing information transformation into incoming data takes place for the center of model kernel. From there transfer to another ray takes place, again through conversion.

Doubtless advantage of the scheme is the fact that information- managing body is separated from the processing layer as recommendations demand, as, for instance, in [1], based on survey research. As disadvantages we may mark absence of direct relations between SM, that's why central module can be overloaded when simple data communication without difficult conversions is needed.

Scheme 2. Unlike the first variant, now each of the basic SM has several other subordinate units. Their function is resolution of subtasks to deallocate basic SM that is regulating task fulfillment generally on the current ray. In fact, the structure resembles hierarchical organization management model with department division. To prove vitality of such model in the describing field we'll refer to a work [2]. A task of building optimal hierarchical structure over intended multitude of executers is considered in the article. An important point is marked: tasks of building optimal organization structure and organization of parallel computing schemes development are *alike*.

Among scheme advantages we'll mark: deallocation of SM from categoric download during task fulfillment; more flexible, in comparison to the first scheme, mechanisms of resolution finding. Disadvantage of the *scheme 2* is excessiveness of possible relations between modules, as when there're complicated transformations the cost of the hierarchical building may be too high.

Scheme 3 has the same abstraction from data domain and abstractiveness of information-logic compound from algorithmic. It gives rich opportunities for an exchange between SM, as connections in a kernel take place without direct transit through center link interpreter. Separated internal *types* of connections: 1) between any two modules of a kernel; 2) between two SM, between center module and SM. Vivid description of the said is all five kernel objects which are in the same information field.

Advantage of the obtained system is unified language inside a kernel framework. As a result-we have efforts cutting for data and managing information, circulating in the system, transformation.

In our opinion, the third scheme has the most valuable characteristics. Let's consider it more thoroughly.

Model formalization

We can speak about four sets, coordinated among each other and the set, representing central unit, that is:

Iu - specifies instructions which can be entered from a *user;*

Iq – identifies *quests* to the saved data and data base structure;

Ip – consists of a set of tasks, fulfilling exchange with the *parallel* computing organization system;

Iv – gives access to information stream of cooperation with the programming system of *visualization*.

Introduction of one more unit is driven by the demand of aim inside the carrier system. As it was already mentioned, the fifth body in a kernel is the central one. *Uc* describes the managing structure of kernel center.

Let's return to consideration of multitude coordination among each other. Let's emphasize the assumption once again that in the third scheme it's possible to bring cooperations in the kernel to two types: between information sets; between this set and *Uc.*

According to this distribution full information-management structure *S* can be presented in two ways:

$$Si: \{Iu, Iq, Ip, Iv\}, Uc, \text{ where we get } S: \{Si, Uc\} \quad (1)$$

or

$$S: \{Iu, Iq, Ip, Iv, Uc\} \quad (2)$$

If taking into consideration that every *I* is initially peculiar type of data (domain), then we can speak about a system of data sets $S = (Ii, i \in \Gamma)$ [3]. Where Γ is a set of domain names.

As we are talking in terms of sets, it is supposed that some operations can be conducted with data, determined as:

Combinations of 4-ary and 2-ary operations, according to (1);

5-ary operations, according to *(2)*.

They have categorical character, for example: high-level concatenation of results of separate modules responses.

Model description if formed into algebra. More profound analysis of its characteristics will continue the research of the obtained model.

Conclusion

System SVP in the shape of information-managing model is presented in the work. Three alternative general schemes, *reflecting main principles of cooperation of system objects,* are suggested.

Further model research, suggested characteristics of algebra with widening of its operations and images promotes development of SVP field.

References

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