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AUTOMIZED CONFIGURATION SERVICE MODELLING IN RESOURCE ORGANIZATION OF THE EXPERIMENTAL RESEARCHES SUBJECT-INFORMATIONAL PLATFORM

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The advantages of person-oriented learning with the active use of computerized educational systems are analyzed. Also a importance of using the subject-information environment of the learning experiment for training of highly skilled specialists is substantiated.

Model-building of structured organization of end-terminal resources for the virtual laboratory environment is carried out. The components of the configuration service are defined and agreed upon the development of the polycomponent platform of experimental research.

The methodological researchs basis are a design theory principles and system programming, which focus on defining of means for structured organization developing of configuration data in the virtual polycomponent learning experiment environment.

Scientific novelty of obtained results is to develop an original configuration model of structured information repository from the virtual laboratory necessary for the correct worked of the hardware-software multi-user learning experiment complex at academic space end-terminal. Completed research will provide realization in distribution body of experimental research platform the unified system interface, which, depending on the operating system, will allow the use of the traditional registry.

Presented techniques provides an opportunity to build a flexible, extra-platform API service that is adapted to needs of students with varying pre-training level.

***Key words**: measuring peripheral devices, virtual laboratory, computerized learning system, configuration service.*

Formulation of the problem. In conditions of comprehensive informatization of education the broad possibilities of personality-oriented learning are revealed with the active use of computerized educational environments. In particular, the deployment of learning experiment within the subject-information virtual platform provides a multilateral activation of student cognitive activity.

The level applied of hardware and software determines the conditions of professional training of future specialists in engineering, while allowing increasing a volume of self-study activities in the syllabus [1].

During the exercise of lab works, student acquires a industrial competences, personally defining the logic of his own actions and applying an individual way of knowing when studying the subject area of professionally oriented disciplines.

Effectiveness of such activities is considered both in terms of its productivity, and applied significance [2, 3], which will be determined by the nomenclature and level of automized of peripheral equipment, mainly implemented on single-board microcontrollers. [6, 7].

With this organization of interactive workshops in an environment subject-information virtual platform the high visibility of transient processes in experimental scheme is ensured, also assimilated basic requirements of WHS, develops the ability to work with measuring devices of printing industry; and manufacture skills and scientific culture grows when analyzing the results of research and subsequent ability to use them in management of particular technological stages. [3, 7].

Analysis of recent research and publications. Problems of information and communication technologies use in educational process are considered by many experts from different points of view. Specifically the quality to building of computerized teaching means are devoted the works of scientists such as V. Bykov, N. Dementiyevskaya, O. Hrybyuk, A. Lytvyn, O. Semenikhina, P. Sokolova, M. Shmakov, M. Shyshkina and others.

Specialization of virtual laboratory works is study subject of researchers T. Grankina and T. Narizhna (in system of chemical education), H. Biletska (in the training of environmentalists), M. Kiktyeva and M. Hladka (for students of food industry), Yu. Zhuk , E. Kozlovsky, G. Kravtsov (analysis of natural phenomena in physics) etc.

However, existing scientific publications focus on the benefits of using virtual laboratory work as separate external independent systems involving animations, video, presentations and mathematical models without the possibility of targeted environment profiling, receiving adaptive instructing, operative control of acquired knowledge, reports generating and of experiment results disseminating; here is not fully covered the problems of design research means with installed measuring peripheral and their organic integration into the academic information space.

A key factor in correct installation and further exploitation of the experimental research environment at end-user-terminal of academic space is the agreed structure of its system interface.

At this stage of virtual laboratory design, it was decided to maintain the parameters and settings of learning experiment subject-information platform in binary model of hierarchical registry database of current operating system [4, 5].

The purpose of the article — is building of configuration model of structured organization resources of academic space terminal for settings storing of virtual laboratory environment, of additional expandable modules, attributes of end-user-profiles, respectively, as objects/subjects of educational process, also parameters and drivers arrays of measuring devices as tools of an interdisciplinary experimental research platform, as well a information about hardware support for the automized workplace.

Presentation of the main research material. The deployment of subject-information platform for experimental research puts forward special requirements to procedural modules organization, in particular, in direction of integration into computerized learning system [7].

Such an organization will include a plurality of graphical interfaces, databases, file notations and other subroutines, thus providing distributed access to virtual laboratory interactive environment, as well as facilitating the distribution preparation, end-terminal automized configuration, operative creation of effective user profiles, flexible adaptation to students needs with different level of preliminary training [1, 2, 3, 5].

Actually, the generalterminaly information about the equipment identifiers used in experiment, along with their drivers and services configurations, also involved in this computer ports, the volume and addresses of covered RAM arrays , data for random number generator, etc., will be stored in the `SYSTEM` key (see figure, region *a*) of the root partition `HKEY_LOCAL_MACHINE (HKLM)`.

Another key to this partition, namely `SOFTWARE`, contains separate subkays for corresponding software modules involved in application complex of experimental research, and `Classes` subkey that covers registered extensions `*.CXO` file of component libraries and `*.CXM` files of subject area graphics pattern [6], MIME types, interface identifiers (OLE, COM, ActiveX) for use by virtual laboratory of service programs or dynamic libraries, as well as setting the GUI for current user of educational space.

Volatile, dynamically generated `HARDWARE` key provides a list of plug-and-play physical devices for virtual laboratory [7]; these currently detected devices are defined by the operating system at boot time.

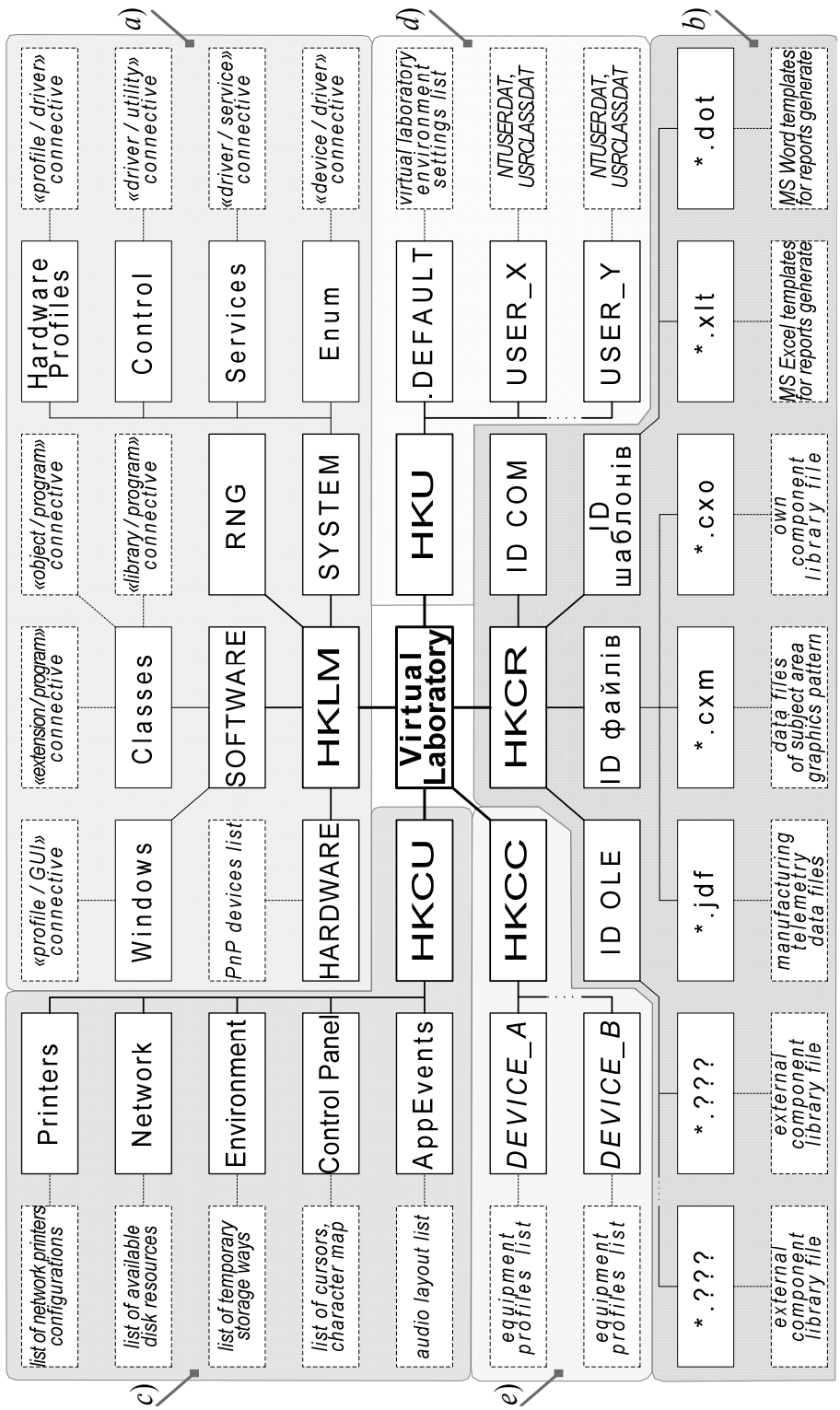
Information about registered experimental researching package modules according to file associations and OLE class identifiers (figure, region *b*) is located in the root partition `HKEY_CLASSES_ROOT (HKCR)`, which allows for variation of practically an infinite number of algorithms combinations for end-terminal behavior [8].

In general, allowing of component-oriented models registration for both the machine and the academic platform end-user, in accordance with the rules of the terminal operating system, here is implemented a compilation of `HKLM` hardware base and user resources of next section of system registry `HKEY_CURRENT_USER (HKCU)`, constructs of which, in fact, are preferred when deploying the virtual laboratory in RAM [5].

Consequently, `HKCU` (figure, region *c*) contains a settings set of authorized console user profile that corresponds to one of entities of the educational information space [7]. `AppEvents` key settings, in particular, are configured to store association between system sounds and virtual laboratory environment events, which facilitates and diversifies a user's actions when compiling the learning experiment scheme.

`Control Panel` contains personalized color palette configurations, character maps and cursors necessary for designing the subject area of the corresponding lab work. `Environment` covers absolute local paths [8] for locating temporary files of active libraries and the current subject area graphics pattern.

Other keys store information about network disk and hardware resources that learning experiment environment modules used, information about registered files extension, as well as the described actions which can be done with these files [5].



Configuration model of structured resource organization for virtual laboratory environment end-terminal

Information about authorized users of subject-information environment of virtual laboratory from teachers to different courses students: such as their profiles, names, passwords, group policies, etc. (figure, region *d*) are provided in HKEY_USERS (HKU) partition, which, like HKLM, is stored on system drive. Dynamically loaded keys of this root partition allow implementing team work on experimental research platform, ensuring the compatibility of remote account activity to their security identifiers (aka SID) at so-called secondary logins in system [3, 8].

Thus, USER_*X* or USER_*Y* who is authorized in academic space will have access to their data from any terminal included in domain; this makes it possible to data backup without having to save the results and settings separately: they are automatically downloaded to current workplace when logged in to domain.

Data on the generalized parameters of hardware and software for learning experiment complex congregate on .DEFAULT key.

Overall, configuration data for active hardware profiles and corresponding drivers used in current training exercises are contained in the partition named HKEY_CURRENT_CONFIG (HKCC). Using the hardware profile for current session (figure, region *e*) allows to configure several options for driver settings that are used when performing various training exercises on one equipment [6].

Although the profile used varies from one upload process to another, the virtual laboratory can refer to this partition to determine the active profile for current session, as defined by curriculum and schedule.

The building model of end-terminal structured resource organization for virtual laboratory environment also provides access to counters for profiling the system's performance [8].

Conclusions. Application of projected configuration service for resource organization of subject-information platform of experimental research at end-terminal of unified academic space is provides creation of target the virtual laboratory distribution, local components of settings and restore points depending on the informative content of the current semester, as well automatic deletion of unnecessary for now keys or parameters.

The developed model may also be available as an instrumental unit for remote and team work in an learning experiment environment. Further research should focus on creating supports scripts [9] based on standard API [6] to parsers the presented model and convert it into configuration services managed by other operating systems [5].

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МОДЕЛЮВАННЯ АВТОМАТИЗОВАНОГО КОНФІГУРАЦІЙНОГО СЕРВІСУ ПРИ ОРГАНІЗАЦІЇ РЕСУРСІВ ПРЕДМЕТНО-ІНФОРМАЦІЙНОЇ ПЛАТФОРМИ ЕКСПЕРИМЕНТАЛЬНИХ ДОСЛІДЖЕНЬ

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Проаналізовано переваги особистісно-орієнтованого навчання при активному застосуванні комп'ютеризованих освітніх систем. Обґрунтовано важливість використання предметно-інформаційного середовища навчального експерименту для підготовки висококваліфікованих фахівців.

Виконано моделювання структурованої організації ресурсів кінцевого терміналу середовища віртуальної лабораторії. Обумовлено та узгоджено компоненти конфігураційного сервісу при розгортанні інтерактивної платформи експериментальних досліджень.

Методологічну базу дослідження становлять принципи теорії проектування і системного програмування, зосереджені на визначенні засобів розроблення методики структурованої організації конфігураційних даних у віртуальному полікомпонентному середовищі навчального експерименту.

Наукова новизна одержаних результатів полягає у розробленні оригінальної конфігураційної моделі структурованого сховища відомостей віртуальної лабораторії, необхідних для коректної роботи апаратно-програмного багатокористувацького комплексу навчального експерименту на кінцевому терміналі академічного простору.

Виконані дослідження дозволять реалізувати у тілі дистрибутиву платформи експериментальних досліджень уніфікований системний інтерфейс, який залежно від операційної системи дозволить використовувати традиційний реєстр.

Наведена методика надає можливість побудувати гнучкий позаплатформовий API-сервіс з адаптуванням під потреби студентів з різним ступенем попередньої підготовки.

Ключові слова: *вимірювальне периферійне обладнання, віртуальна лабораторія, комп'ютеризована навчальна система, конфігураційний сервіс.*

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