O. Markelov

Lviv Polytechnic National University, Computer-Aided Design Department

INFORMATION INTEGRATION OF THE REPOSITORY OF SOFTWARE UI COMPONENTS WITH THE DATA STRUCTURE OF USER INTERACTION

© Markelov O., 2013

The structural model of information integration data about the software UI elements (different graphic representations, properties and parameters, and multi source code implementation in various programming languages, etc.) with the structural modules of tracking and storing data about interactions of user interface is proposed.

Key words: information system, user interface, UI, database, repository, user interaction, usability.

Запропонована структурна модель інформаційної інтеграції даних про елементи інтерфейсу користувача програмного забезпечення (різних графічних представлень, властивостей та параметрів, та їх мультиреалізації програмними кодами різними мовами тощо) із структурними модулями засобів фіксування на накопичення даних про інтерактивні взаємодій користувачів з інтерфейсом.

Ключові слова: інформаційна система, інтерфейс користувача, база даних, репозиторій, інтерактивність, зручність використання.

Problem and actuality

While designing the user interface of software and automating these processes for software development what we need is not only to research range of interface elements [1] and these visual and source code parameters [2] but also to have reliable and various information about the timing and quantitative particulars of interaction of the end users with a finished software screen interface. These data will be used to form a probability of selection criteria for alternative interface forms, for specified software functionality. That is why developed information models of the repository [2] interface elements are necessary to complement with a statistical data of their usage [3, 4].

Purpose of research and designing

The integration of data about how the end users use windows graphics interface and these parameters of the interface (that is used by programmers and designers) will help to speed up the process of design, choice of the possible alternative solutions and help to form new implementation and new versions of software user interfaces.

Information structure

The subsystem of collecting and storing parameters of informational user activity [4] performs:

- automated tracking of user interaction with interface controls of CAD Software;
- recording mouse or pen tablet movement coordinates and vectors;
- recording press, clicks, selections, highlight etc.;
- recording time that user spend reading some text or studying user interface controls variants.

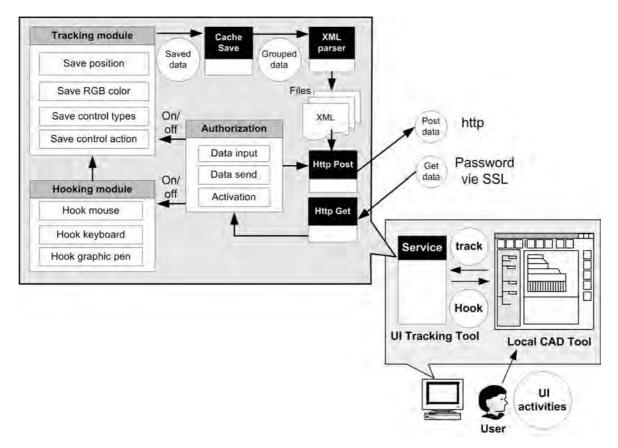


Fig. 1. Data storage subsystem for interactive user interaction with the software

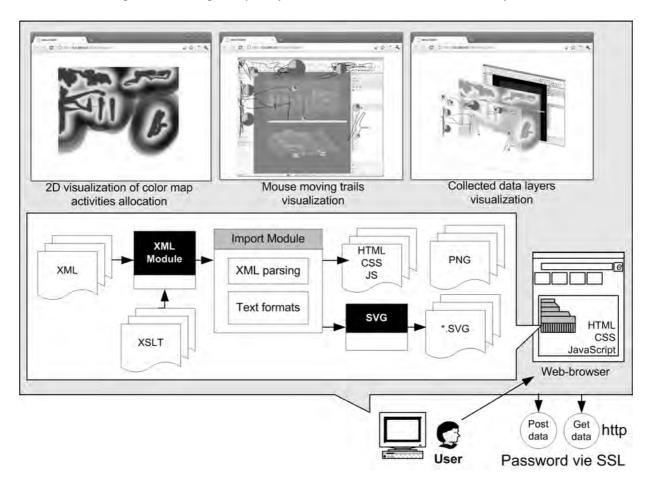


Fig. 2. The visualization subsystem of statistically processed data of user interactions

Main features of the tool architecture:

- Multi-user access;
- Standard web-browser and special software tracking tool for the client part;
- Cross-platform compatibility;

All architectural components physically are placed on one Internet server, which works as a Webserver and handle numerous clients of the system. For the remote work with the tracking processor a standard Web-browser is sufficient, such as Internet Explorer, Firefox, Opera or Google Chrome with Scalable Vector Graphics support for better visualization. All information exchange between the user and the server is being by standard HTTP protocol and SSL.

The main modules:

- module of the Web-portal administration allows access control and management over accounts of a portal on the part of users and general portal resources;
- module of the experiments organization of the Web-system allows to keep a records of hooked user's activities, to keep a records of the UI controls session tracking, statistical modeling;
- security module of Web-system carries out a mechanism of all system user's and tracking identification;
- module of export / import of the design data in / from the system provides the functions of forming design information in text, formal XML, bitmap, vector and polygraphical layouts;

The system architecture is built on the HTML5, Ajax, CSS, XML, PHP, MySQL, SVG, C# technologies. General server architecture of the proposed Internet/Intranet-oriented tool is shown on fig. 3.

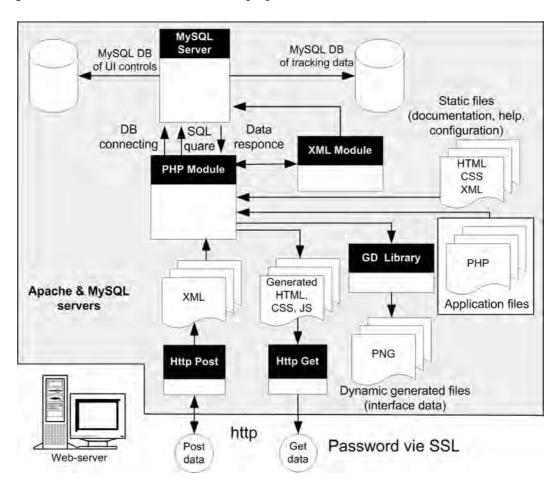


Fig. 3. The server part of tool

User experience research tasks and results are being saved to the central relation database. Recorded local tracking data is send to server vie post request as XML data. On server data from XML is parsed to DB fields for last processing by SQL (Structured Query Language) requests.

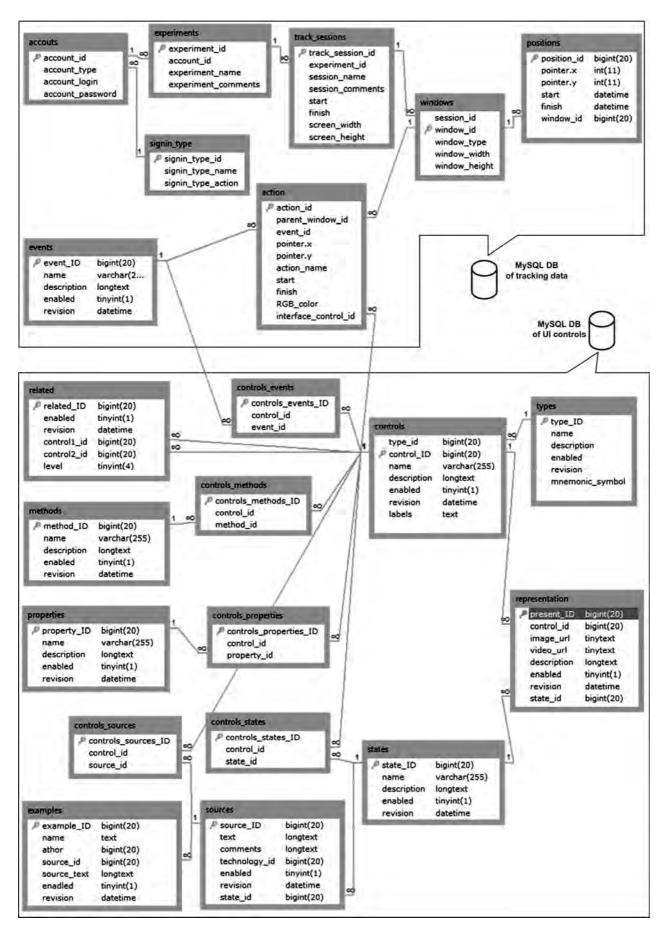


Fig. 4. The relational data model integration of data from the UI controls repository with the storage data of user interface interaction

Conclusions

The proposed information model of data integration of the user interaction and data used by software developers will help to form additional criteria for choosing structural elements of the interface and build variants of interface design for different groups of users based on the statistical processing of data and interactive use of these interfaces.

1. Markelov O. The Review of CAD Software in Machinery Design: Spectral Characteristics of GUI components / O. Markelov, M. Lobu r // CAD in Machinery D esign. Im plementation and E ducation Problems: Proceeding of the XX U krainian-Polish Conference CADMD'2012 (Oct 11-13, 2012). – Lvi v, 136 c. – P. 96– 98, ISBN: 978 -617-607-332-1. Ukraine: Publi shing H ouse Ve zha&Co, 2012. – 2. Mark elov O. D atabase of visual and source code components of user interface: information model design / M arkelov O. // Вісн. Нац. ун-ту "Львів. політехніка" – № 747 : Комп'ютер. системи проектув. Теорія і практика. — Львів: Вид-во Нац. ун-ту "Львівська політехніка". — 2012. — С. 109—114. — Бібліогр.: 22 назв. 3. Markelov Oleksandr, Collecting Data of User's Activities in Interface Layout of MEMS CAD Software / Oleksandr Markelov, Mykhaylo Lobur, Sofia Bobalo // Perspective Technologies and Methods in MEMS Design: Materials of the VI-th International Conference MEMSTECH'2010, April 20-23, 2010. – Lviv-Polyana: Publishing House Vezha&Co, 2010. – 284 р. – Р.44–45. 4. Маркелов О.Е. Моделювання досвіду користувача програмного забезпечення САПР накопиченням діалогової інформаційної діяльності / О.Е. Маркелов, М.В. Лобур. // Вісн. Нац. ун-ту "Львів. політехніка" – № 685: Комп'ютерні системи проєктування. Теорія і практика. — Львів: Вид-во Нац. ун-ту *"Львівська політехніка".* – 2010. – С. 181–186.