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INFORMATION SYSTEM OF SOFTWARE DISTRIBUTION

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One of the approaches to building a software distribution information system is examined. The results of researches on conceptual, architectural and technological issues of software support are shown. Business, user's and functional requirements to the software updating systems are considered. Updating system architecture is examined in whole and in particular parts. Interaction of main components of the system is revealed. The aspects of users' feedback organisation are considered as well.

Keywords: *Information system, web-services, updates, feedback, distribution, software, application store, e-shop.*

Kherson State University is one of the leading vendors of pedagogical software on mathematics and informatics in Ukraine. Since 2000, there were developed more than 10 software products, which were stamped by the Ministry of Education and Science of Ukraine, and were used in more than 2000 rural schools of Ukraine. Nevertheless, the issue of software distribution among parents and its further popularization abroad remains unsolved. Hereby, a problem of information, technical and methodological support of pedagogical software distribution appears. The necessity of solving this problem sets a number of tasks, to solving which this research is devoted.

The tasks that were set while solving the problem are the following: to develop the concept and architecture of the system of software distribution and support; to choose the technology of its implementation and implement the system.

Conceptually, the information system of software distribution is an Internet service with functions of an e-shop and it is designed for distributing, supporting and updating software, as well as for working with software users, like: getting feedback and notifying users about the events happened.

Architecturally, the information system of software distribution consists of the following subsystems: a website with software description, updating system services, an updating client system, a users' support system, a billing system. Some of the subsystems are inter-integrated. Let's examine each subsystem in details.

Website.

A website is a «face» of the system. The website represents a level of the user interface of the server-side.

Functions of the website are the following:
- Information – designed to spread information about the company and its products;
- Promotion – created to advertise products and cervices provided by the company;
- Users support – destined to give users a possibility to communicate with software developers;
- Software distribution – the website performs the functions of an e-shop, and, moreover, provides software updating services;
- Communication – designed to give users a possibility to communicate with each other;
- Educational – the website provides access to educational information about products and services;
- Financial – the website contains a module of finance accounting, as well as an «Accountant's Workplace»
- Reporting – the website provides a possibility to generate necessary reports.
- The website gives its users the next possibilities:

- sign up, authentication, authorization;
- browsing a list of products;
- viewing a detailed information about a product;
- purchasing a product;
- ordering a product
- paying a fee
- browsing information materials about the products;
- viewing reports on funds movement;
- leaving a feedback to product developers.

Updating System

Updating is one of the most important tasks of software maintenance. An updating system is a complex of program units, designed to automatically update main software program units. A major task of the updating system is to maintain software integrity and operability by synchronizing software program units and configurations with reference data.

Software updating enables users to get the latest versions of the products with the maximum available functionality and without bugs. Likewise, using the latest versions by the users provide a vendor with a possibility to fix bugs in time, spend less time on testing and not to waste time to support a lot of versions simultaneously.

Modern web applications provide updates as soon as they think it is needed, while users cannot even notice this, if the changes are minor.

Therefore, using the updating system brings the quality of using desktop systems closer to the level of web applications.

- Types of Software Updating Systems

Among main stages of work of any updating system, the following ones can be marked out [2]:

- getting a notification about a new version;
- downloading an update;
- update installing;
- launching an updated program.

There is a need to admit, that there are several types of updating systems, depending on the level of the stages automation. Let's examine the main ones in details.

There are the next main types of software updates:

1. reinstallation;
2. automated update with a request to a user;
3. automated update without a request to a user.

	1)reinstallation	2)automated with a request	3)automated without a request
New version notification	Other communications (e.g. e-mail)	Built-in	Built-in
A need for a user to address a website	Yes	No	No
A decision about installation is taken by a user	Yes	Yes	No
Using the latest version	No	No	Yes
A level of difficulty for a user	Medium	Minimum	Minimum
A necessity to restart a program	Yes	Yes	Depends on implementation
A need to track the versions installed to fix bugs	Yes	Yes	No

Table 1. Comparative Characteristics of Update Types

1) reinstallation
2) automated with a request
3) automated without a request

	New version notification	Other communications (e.g. e-mail)	Built-in	Built-in
A need for a user to address a website		Yes	No	No
A decision about installation is taken by a user		Yes	Yes	No
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Choosing the Type of the System for Updater Implementation

After analyzing the data from the table 1, we can make a conclusion that the most optimal variant of updating system realization is the one with automated update without a request to a user. In addition, in a specific realization under study an update is run before a program launch, enabling a user to always use the latest version.

There is a need to mention a drawback of this system: the amount of information that can be downloaded from the Internet is big enough to cause certain inconveniences for a user, like when using a mobile Internet in roaming.

The variant with a request to a user doesn't have this drawback.

Updating System Implementation

Let's examine the updating system having been implemented, as a whole.

The updating system consists of 2 sides: a server (an updating system website, a file server of updating system, an e-payment provider) and a client one (updating system clients). The diagram of deployment is represented on the picture 1.
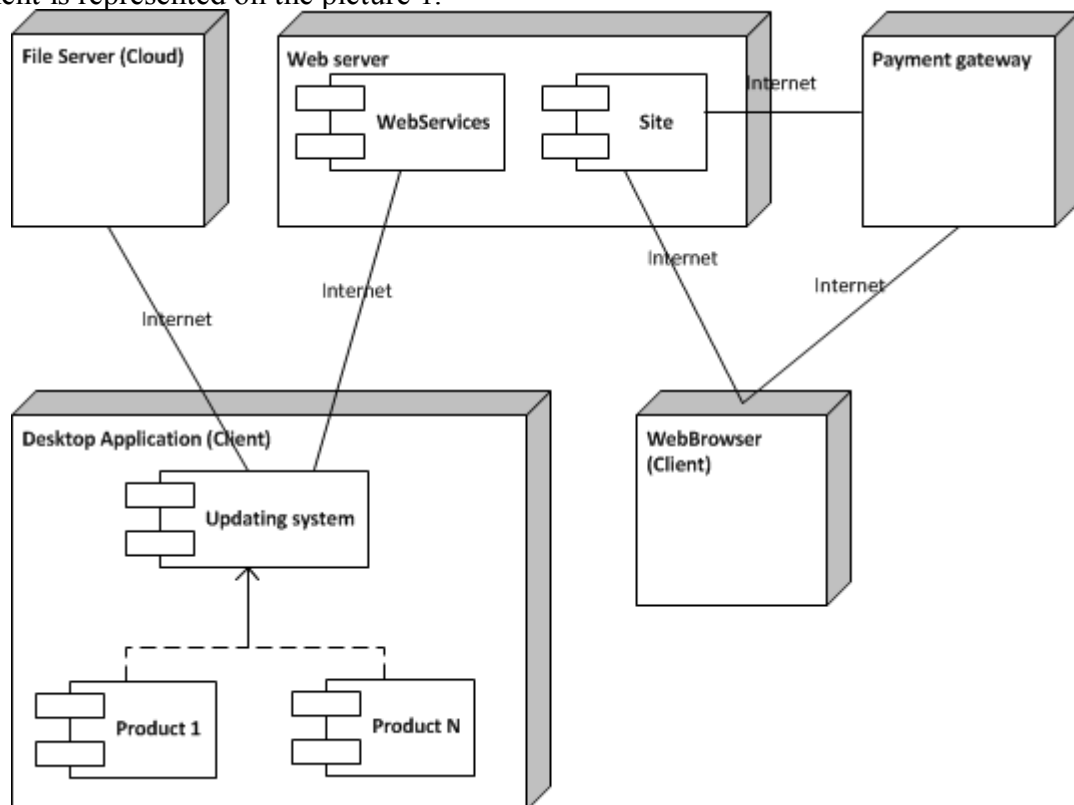
Picture 1. Diagram of deployment

Web Services and Update Client

Web services are designed to serve requests of desktop application clients as well as to provide API to developers of third-party applications.

A server side represents server software, which provides a permission check for getting updates, publishing reference files and configurations, interaction with a client side.

A client side represents an additional software unit, which can interact with an update server, define the necessity of updating on the basis of the data, received from the server, and request the updates needed from the server. .

Main types of interaction between web services and a client are the following ones:

- updating the product units to the latest version (this allows to get the new functionality of
- the units and fix all possible bugs);
- downloading new units, which are available due to the license;
- downloading localization files;
- activating a copy of the product.

The process of interaction is demonstrated in details on the picture 2.
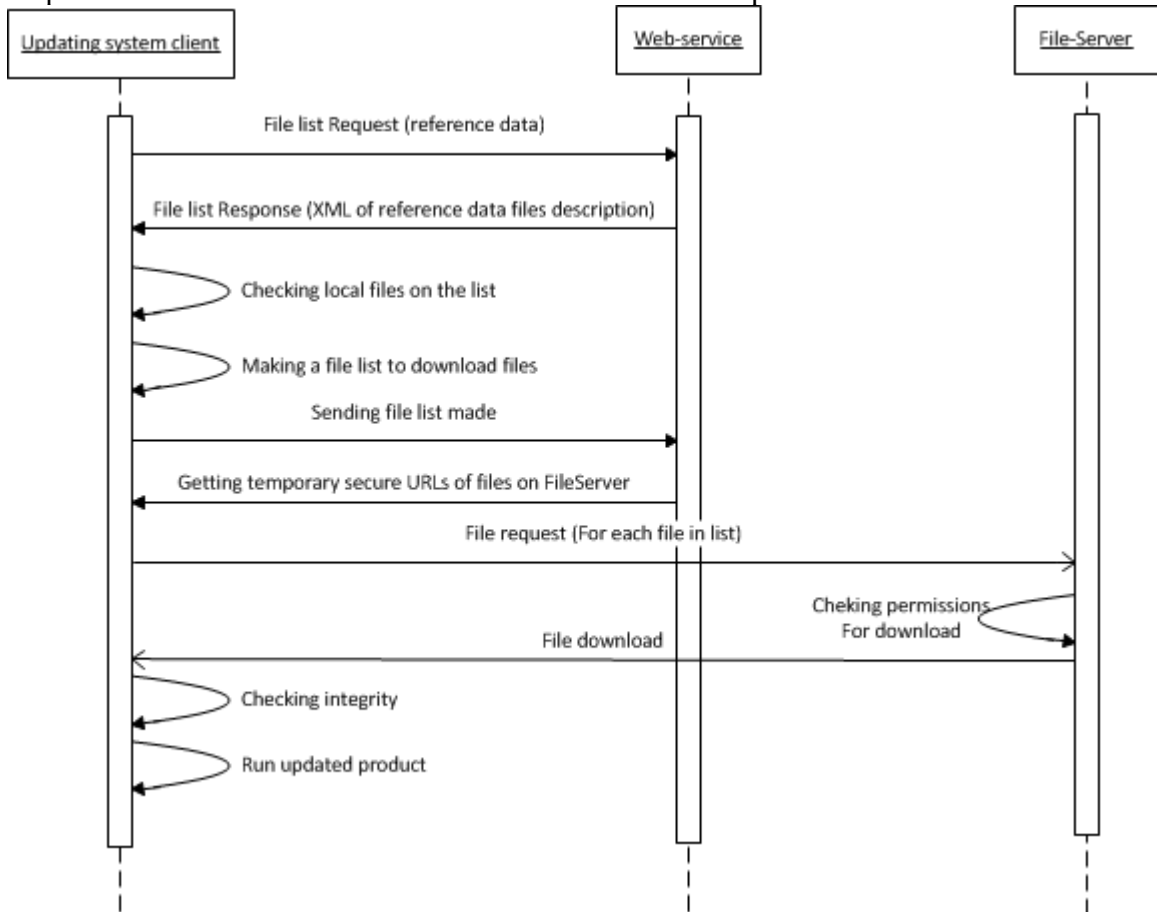
Picture 2. Diagram of web-service-client-file-server interaction

Secure data transfer is provided by a digital certificate having been signed to all necessary requests.

File server represents lightweight httpd server with a "secure download" module, which supports files returns by dynamic URLs. This type of servers can be hosted at computer clouds or at CDN (content delivery network) to solve a scalability problem.

Local program copy protection from cracking or unlicensed use is also one of the main tasks of updating system and intersects with it functionally. Updating system client checks the integrity of program files by comparing them to the reference ones at every launch, and in case the files have been changed the program would not launch. A user gets a notification about the necessity to update the program, during which the changed files are replaced by the reference ones.

A user interface of the update client user allows not only to update software, but also to install new products. A form of product choice lets a user to choose a product category, browse a category chosen and choose a product to install (picture 3).
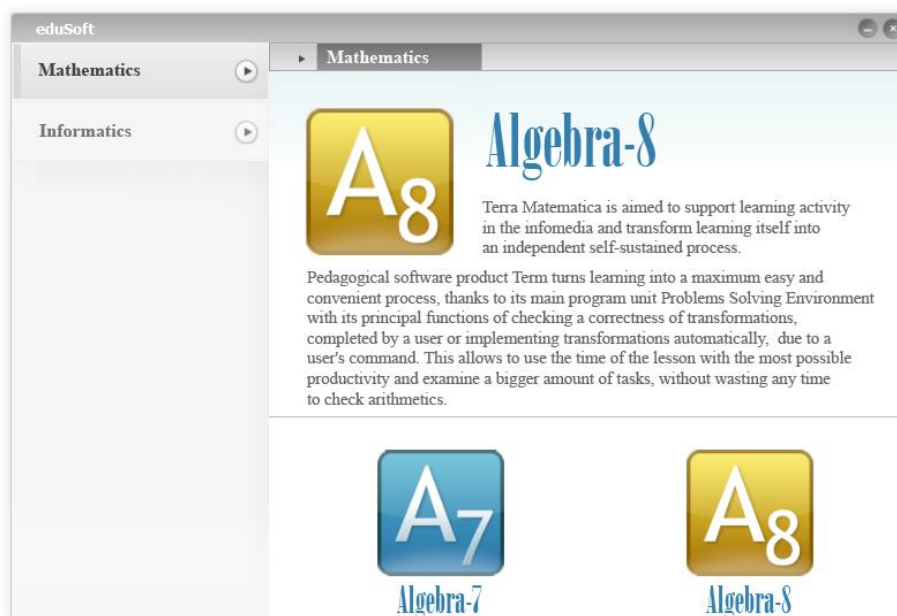
Picture 3. Form of choosing a product to install.

There is a need to admit, that the developed technology allows to organize a storage-shop of software products (i.e. an application store, a software market) and in some respect is an analog to a repository of UNIX-based operating systems.

Customer Support Centre

Another important task is to organize an interaction between users and a vendor company. Users should have a possibility to point out an error or a fault, to offer their ideas and express their thanks. This task is solved by the Customer support software.

A module, designed to solve this task is named «Customer Support Centre».

The module keeps a record of requests, received from users, and tracks their further processing.

For a selected product, a user can:
- express his or her delight;
- offer an idea;
- report an error;
- ask a question.

Every inquiry is forwarded to a relevant specialist of the company, who leads the work with a user's inquiry at a later date.

Billing System

A billing system provides an appropriate work with financial information, adjusts users' permissions to update the products and ensures receiving payments via e-channels.

Receiving payments is implemented in two modes: online and offline.

Offline mode is designed for the users, who don't have a credit card, and for cashless transfers. In this case, an accountant enters the data into the system.

The process of e-payments receiving is totally automated. Receiving payments is implemented using 3-D Secure technology.

To fulfill payments using 3-D Secure technology, a card holder needs to sign up an appropriate authentication system of an issuing bank, named ACS (Access Control Server), and get a password, known by a card holder and a bank only. While implementing a transaction on the Internet, an e-shop establishes a connection between a payment server and a certain system, like Visa or MasterCard, by passing general parameters of a transaction to a centralized resource (a payment server of an acquiring bank).

This is implemented with the aim to check if a card holder is a participant of the Verified by Visa or MasterCard SecureCode program. In case this system, named a 'Directory Server', returns a positive response, a request to authenticate a card holder is sent to an issuing bank. This request is

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passed to an issuing bank as a parameters string, which is linked to an acquiring bank's authentication system URL (a web address). URL with the parameters is passed to a buyer's browser. Thus, a buyer is redirected to the authentication system of his or her acquiring bank.

A bank requests a password from a card holder, which was issued during a sign up process to the Verified by Visa or MasterCard SecureCode. After a card holder's personality is confirmed, an authentication system of an issuing bank generates a special unique digital value, acting like a "signature", which certifies the transaction. This "signature" is passed to a payment server and then becomes a part of an authorization request, which is passed by an e-shop (a payment server) to its acquiring bank, and the latter, in its turn, passes the authorization request to an issuing bank. After the signature is checked and an ability to pay is assured, an issuing bank completes (approves) a transaction. Hereby, an issuing bank authenticates a card holder at the moment of payment implementation, and notifies an e-shop in a real-time mode if a buyer actually is a card holder.

Thanks to this scheme, a store is protected from occurring of clients' arguments and refuses from a settlement of transaction.

Stack of Technologies
    WebServer:
        Linux+Apache + PHP +CakePHP + MySql
    FileServer:
        LightHttpd+ ModSecDownload
    DesktopClient:
        .NET 4.0 – desktop client

CONCLUSIONS

Development of the information system of software distribution allowed to solve the task of software distribution and support. Given solution can be used to support almost any type of software. The system is close to web sites by its update rapidity. A usage of Customer Support Centre and Billing System modules allows to organize an e-shop on the basis of the system.

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