

David FOJTÍK\*, Marek BABIUCH\*\*

## ARCHITECTURE OF USER-FRIENDLY CASHBOX SYSTEM

### ARCHITEKTURA UŽIVATELSKY PŘÍZPŮSOBIVÉHO POKLADNÍHO SYSTÉMU

#### Abstract

This paper describes the architecture of the newly implemented complex solution of cashbox system for ticket selling with automatic sales records, especially created for the Gallery of Fine Art in Ostrava.

#### Abstrakt

Tento příspěvek popisuje architekturu nově vytvořeného komplexního řešení pokladního systému prodeje vstupenek s automatickou evidencí speciálně vytvořeného pro Galerie výtvarného umění v Ostravě.

## 1 INTRODUCTION

During the last year a main building of the Gallery of Fine Arts in Ostrava (GVU Ostrava) was going through partial reconstruction and it was an occasion to modernize a method of the ticket selling. The former selling and its accounting were done manually with no computer support. The main administration deal lied upon seller's shoulders. The sellers (usually senior citizens and students with a temporary or summer jobs), were manually recording the ticket selling, and solving statistic etc. This method became unacceptable.

## 2 GOALS OF SOLUTION

First of all, with the help of the Gallery of Fine Arts management in Ostrava we defined a specification for a problem solution that can be summarized into the following points:

1. Central selling register – at any time it is very important to get a quick summary about the actual state of selling and its history, process, cashbox state etc.
2. Flexible menu – offers of exhibitions, expositions and other events are very variable. The new system should be able to easily build and edit offers and also each menu item should be able to determine the valid time interval.
3. Selling additional services and things – apart from the main offer (main menu) a buyer can buy more services with the main offer, such as a commentary text from an expert guide, a CD, DVD, book or souvenir etc.
4. Various prices and sales campaign with a discount price – the new system must support various price policies for specific groups of customers such as: families, students, seniors, physically handicapped people, group of schoolchildren etc. And also must support some sales campaign with a discount price.

---

\* Ing., Ph.D., Department of Control Systems & Instrumentation, VŠB -Technical University of Ostrava, av. 17. listopadu 15, CZ-708 33 OSTRAVA-Poruba, +420 597 324 193, david.fojtik@vsb.cz

\*\* Ing., Ph.D., Department of Control Systems & Instrumentation, VŠB -Technical University of Ostrava, av. 17. listopadu 15, CZ-708 33 OSTRAVA-Poruba, +420 597 324 173, marek.babiuch@vsb.cz

5. Simple and well arranged handling – The sellers are usually senior citizens or students with a temporary or summer job. For this reason the selling application must be very easy and with intuitive handling.
6. Selling office extensibility – although the first realization assumes only one selling place, in the future they are thinking with many selling offices.

### 3 CONCEPT DESIGN

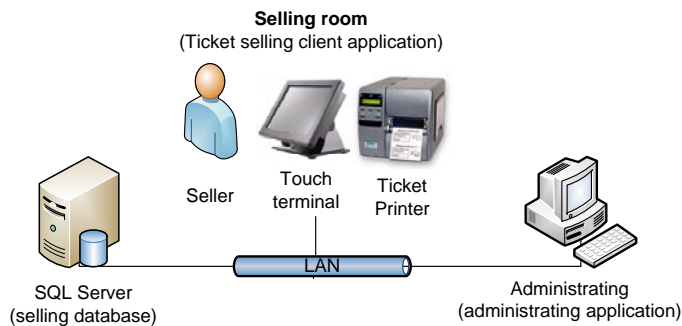
As the main concept for problem solution we decided to build our system on client-server technology, where a client is composed from two applications:

1. Ticket selling client application,
2. Administrating client application.

Both applications are build on Microsoft .NET Windows Forms technology.

The first application serves ticket selling only. This application must be very easily handled without using keyboard or computer mouse. All functions must be comfortable and use touch display only.

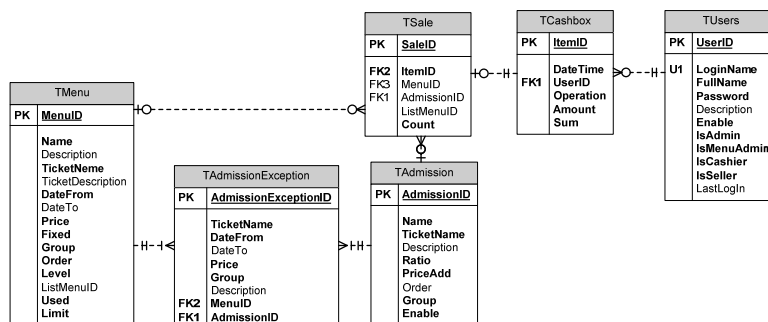
On the other hand, the administrating client application is assumed to be running on a standard PC computer. This application will be managing all offers, services and prices and also application users. Furthermore, it will administrate the cashbox and selling statistic.



**Fig. 1** Basic concept

#### 3.1 Data centre

Data centre of the system is a database on Microsoft SQL Server 2005 Express. All data access is realized through stored procedures or functions. Database table *TUser* stores users and their access rights for both applications. Users are divided to sellers, menus (offers) managers, cashiers and user administrators.



**Fig. 2** Database model

Menu items are stored in *TMenu* table. This table is common for both kinds of offer; main menu (*Level = 1*) and additional services (*Level = 2*). Additional services are linked with main menu by column *ListMenuID* that is list of services which would be disabled. Each menu item has a name and a description separately stored for a check button in the selling application and printed text on ticket. And it also has a time interval in which the items are visible.

A special part of the problem solution is the calculating method of the ticket final price. The final price depends on a chosen type of price rate (e.g. full price, students, seniors, school, family etc.) that is stored in *TAdmissions* table and the price and fixed values that are part of a menu item. If fixed value of *TMenu* item is 0 then the ticket price is calculated by the expression:

$$TicketPrice=Price*Ratio+PriceAdd.$$

On the other hand if fixed value is 1 then the price can not be changed and the ticket price is the same as the price of *TMenu* table.

The final price can be multiplied by a value of the customer count (such as a group of school children). But for a family admission, the count of members mustn't modify a price. For this purpose both tables have the *Group* value. If *Group* value is 1 then the count of visitors does not multiply a ticket price.

The third case that could modify the ticket price is by especially recorded value in table *TAdmissionException*. For each combination *TMenu* item and *TAdmission* item can insert a row in *TAdmissionException* table that would change the price for an assigned time interval. In other words, the table *TAdmissionException* realized some sales campaign with a discount price.

Realized ticket sales are stored in *TSale* and *TCashbox* tables. *TSale* table stores information about what was chosen (*menu + services* or *goods + admission*) whilst *TCashbox* stores cashbox receipt, date and time of sale and a seller ID. The *TCashbox* table also stores a cash deposit, withdrawal and balancing that was executed by a cashier.

### 3.2 Administrating client application

Administrating client application is realizing four basic functions:

1. Application user administrating;
2. Offers, services and price administrating;
3. Cashbox administrating;
4. Sale statistic calculation.

All these functions are protected by a user password. Based on user rights the application enables or disables particular functions. Graphical design of this application is build on the multiple document interface.

The interesting function is calculating sale statistic. The user can specify a time interval, menus, and admissions and after clicks to show button he receives required information. Information is shown in a special color grid with group sections that can be expanded by clicking on + symbol. The statistic and a cashbox list can of course be printed.

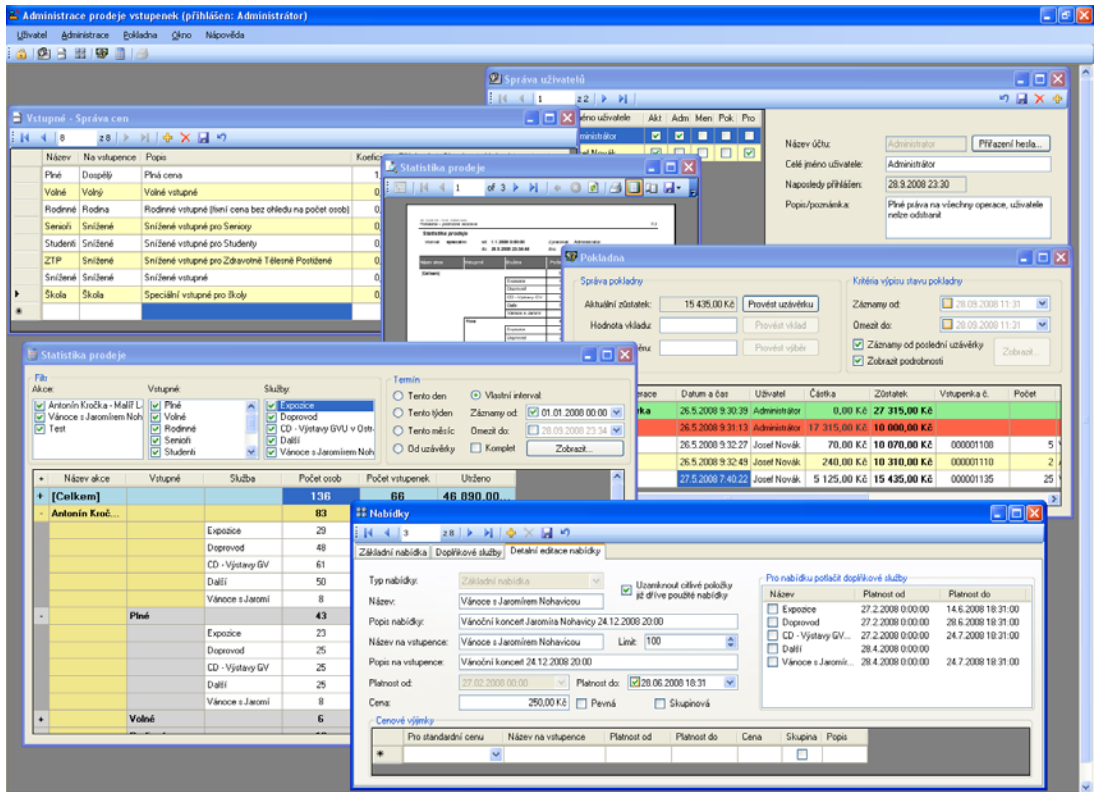


Fig. 3 Administrating application

### 3.3 Ticket selling client application

As opposite to the administrative application, a ticket selling application is much simpler. An application is formed only by a single form which is activated after a successful login. User interface is completely realized for touch screen, it means that it does not need any keyboard or PC mouse for any function of this application.

The main part of the form is composed of three columns of buttons that are built base on validated data records in *TMenu* and *TAdmissions* tables. The first column includes a button list of main offers (menu), the second column includes a button list of additional services or goods and the third column shows a button list of admission types.

The right part of the form has a touch software numeric keyboard, buttons for tickets printing and information window previewing a ticket and showing other information.

The bottom part of the form includes a list of buttons representing other application functions, such as exit, logout, locked and a button that shows a dialog with information about cashbox state, receipts and a simple statistic.

The process of selling and printing tickets is as follow:

1. Seller pushes one of the buttons main offers at first column. Thereafter application enables a valid button on other columns.
2. Seller pushes one or more buttons of the second column to select additional services or goods. If a customer doesn't want any of those things the seller can skip this column.

3. Then pushes one of the buttons third columns which will assign admission. Thereafter application solves price and shows a ticket preview.
4. Seller can continue either by entering count of customers or directly pushes a button to print ticket for one person.
5. Finally, a seller either pushes print button for printing one group's ticket or (if the button is enabled) pushes a button for printing a group of single tickets per person.

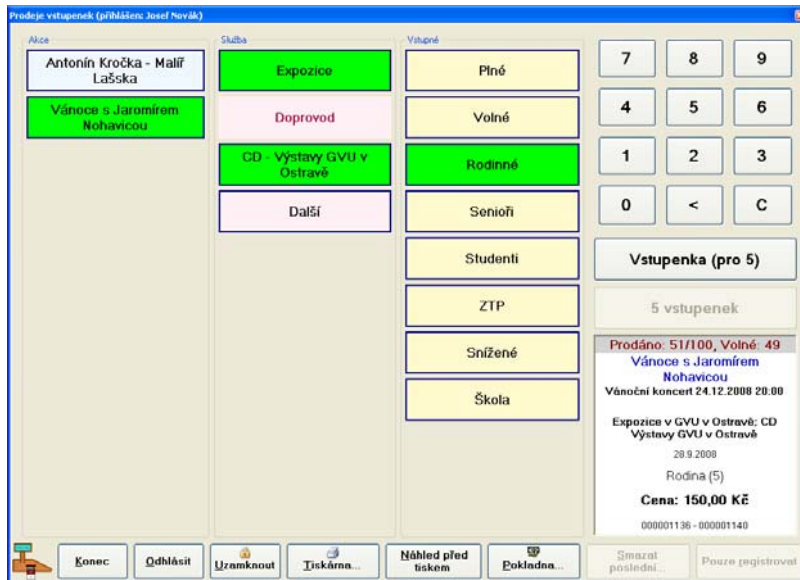


Fig. 4 Ticket selling application

#### 4 HARDWARE OF SOLUTION

A hardware part of the system consists of one server, administrating client PCs, selling touch screen PCs (terminals) with a line printer and a net infrastructure.



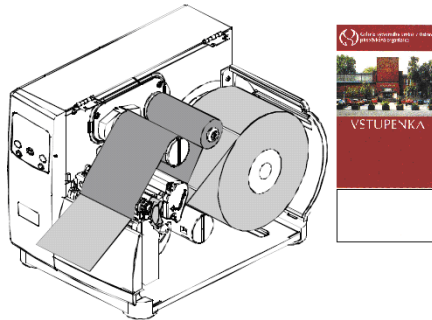
Fig. 5 Terminal X-Touch FT150 and Printer DATAMAX M-4208

Concretely, it uses a silent terminal X-Touch FT150 with Windows XP home operating system. It is an industrial PC with specifications:

- 15" touch screen display,
- CPU 1.5GHz,
- 512MB RAM,

- 40 GB HD,
- 1xLPT, 3xCOM, 1xRJ-45, USB, PS2.

For ticket printing it uses a printer line DATAMAX M-4208. Basically the printer prints only black text on a sheet of a roll semi-finished color tickets which is especially made for this purpose.



**Fig. 6** Printing principle ant blank ticket

## 5 CONCLUSIONS

Since 1.5.2008, the system is in real operation. We can evaluate this system solution, it is working very well. Sellers got already used to a new application. After a practical demonstration they were immediately able to use this application. The managements of the Gallery of Fine Arts in Ostrava are pleased also. They are very satisfied with sale transparency and solved statistic ability.



**Fig. 7** the Ticket selling application in real operation

## REFERENCES

- [1] KULHÁNEK, J. The Speed of Component-Based Application in .NET Platform. In *5th International Carpathian Control Conference*. Zakopane, Poland : AGH-UST Krakow, 25. - 28. 5. 2004, pp. 843-848. ISBN 83-89772-00-0.
- [2] FARANA, R. *Metodika návrhu informačních systémů s důrazem na použití v průmyslové praxi* Vědecké spisy FS, VŠB-TU Ostrava, Edice Habilitační a inaugurační spisy, sv. 37, 2007, 36 s. ISBN 978-80-248-1395-0

## Reviewers:

prof. Ing. Štefan Kozák, PhD., Slovak University of Technology in Bratislava

doc. Ing. Zdenka Prokopová, CSc., Tomas Bata University in Zlín