

**UWAGA! To nie jest kompletna wersja pracy.
Pełna wersja projektu składa się ze 130 stron, w
tej próbkce dostępne są jedynie wybrane z nich.**

Information System
Project

Marcin Otorowski & Sławomir Bartosiewicz
Group 343, academic year 2007/2008 2nd semester

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Characteristics of organization

Verbal description

Smart is a computer store, run by a partnership of its owners. Established in 2005, it became one of the leading software and hardware sellers in its region. Since it was ran, the main activity (also presented in business plan) was selling hardware and supporting customers by professional helpdesk and support. After a couple of months priorities changed according to new needs and opportunities on the market, and the company driven by the results of re-analysis of market stopped offering support activities, and started selling software. The company started to increase number of employees, as financial results counting quarter to quarter were still getting better, and the offer was expanded into such areas like operating systems, office and maintenance solutions, as well as GIS and CAD/CAM software for professionals.

Established by IT specialists, the very essence of business concept is providing well-fitting solutions and products to customers, building long-term relationships and having in mind the quality of product and satisfaction of customer. To achieve this from the beginning of 2006 the company offer includes reselling ready-to-use PCs, consisting of equipped hardware parts and occasionally software (including operating system, OEM software and so on). Research has shown, that only 15% of customers are IT specialist, whose first priority is to be able to choose the components of their PCs and for whom time is not as important. For other customers, there are always some set equipped already, which are standardized and offered under different names and compositions (for instance "XL for players" or "Student set").

During first two years of business activity, Smart built up a compact database of its contacts, including wholesalers and deliverers. Company tends to cooperate in long-term period, which reduces costs, improve internal structure, and allow to negotiate conditions for both sides. As competition grown, Smart started to look for another sources of deliveries, which eventually led to growth of deliverers databases. As of today, the number of active contacts exceeds 350, and maintaining database is high in hierarchy believed by owners, who are really sensitive on the way company cooperates with its partners.

As of the end of 2007, Smart serves nearly 25 000 transactions yearly, from which almost 75% of revenue is generated by hardware and sets. They are served by 7 employees, working at different time-conditions (full-time, $\frac{3}{4}$ or half-time). Growing level of competition, that grew in last year forces Smart to look for new ways of serving better product and service in more efficient way.

From January 2007, company outsources external accountancy service.

Problems of current information system

A company have been using its own IT system, designed to originally designed needs and business concept. However after couple of months, several area turned out to be not efficient, or in certain areas even totally not suitable for current needs and conditions.

When in the middle of 2005 Smart introduced a new node in their offer (sets), a series of complications have begun. The very problem was, that sets have been kept in databases as separate products, with no connection to the component they included. As a result, there were many troubles in case of complaint and quality assurance program, as no information about components was stored.

Current number of employees working for the store is 7, and they are two managers for HR and sales. Current system of storing identity of cashiers is not sufficient, as it does not provide any authentication of user. This is important, because for summer managers want to hire 2-3 sales persons for part-time job. Modification of current system is therefore a must, and its most important part is system of authentication, based on individual login and password protection.

Next issue, which needs to be solved is ability to store data about individuals named customers, like name surname and address. Current system keeps in database data of customers, but only speaking of companies, that have tax identification number (NIP). In previous years however, a vast number of cases occurred, when individual customers wanted to receive VAT invoice for natural persons. Currently, this operation can be only done by obscure workaround: putting customer's details as a name of company into the database, which is inconvenient and does not have semantic meaning and reason.

In January 2008 a market-directed research was done, showing that number of complaints increased year-to-year by nearly 70%, achieving 231 in 2007. From those, 68.56% were complaints to hard disks falling at certain circumstances, which company sold between March 2007 and July 2007. The whole line was cancelled and returned to producers, and all the complaints were handled positively. For the whole period, all the activities related to complaints were maintained and stored manually, with only a minimum help of computer system (data about invoice, etc.). This relatively huge amount of complaints in 2007 forced company to rethink the way it handles them, as it was very time occupying, and the flow of documentation and information was leaking.

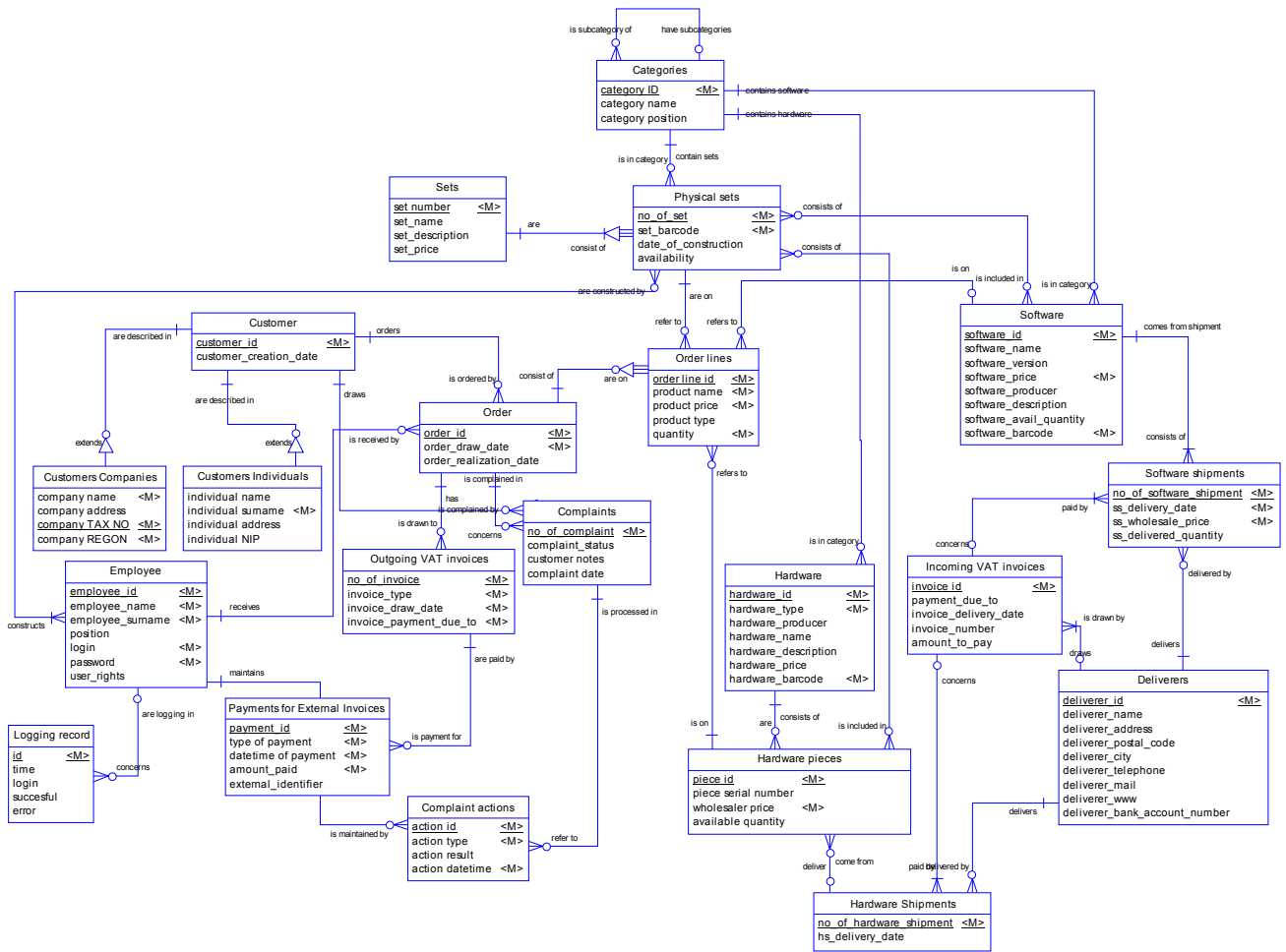
A fully-functional system should smartly connects described areas, making it easier to manage, control and let the information and feedback flow without unnecessary delays and wastes of time.

Analysis of the system

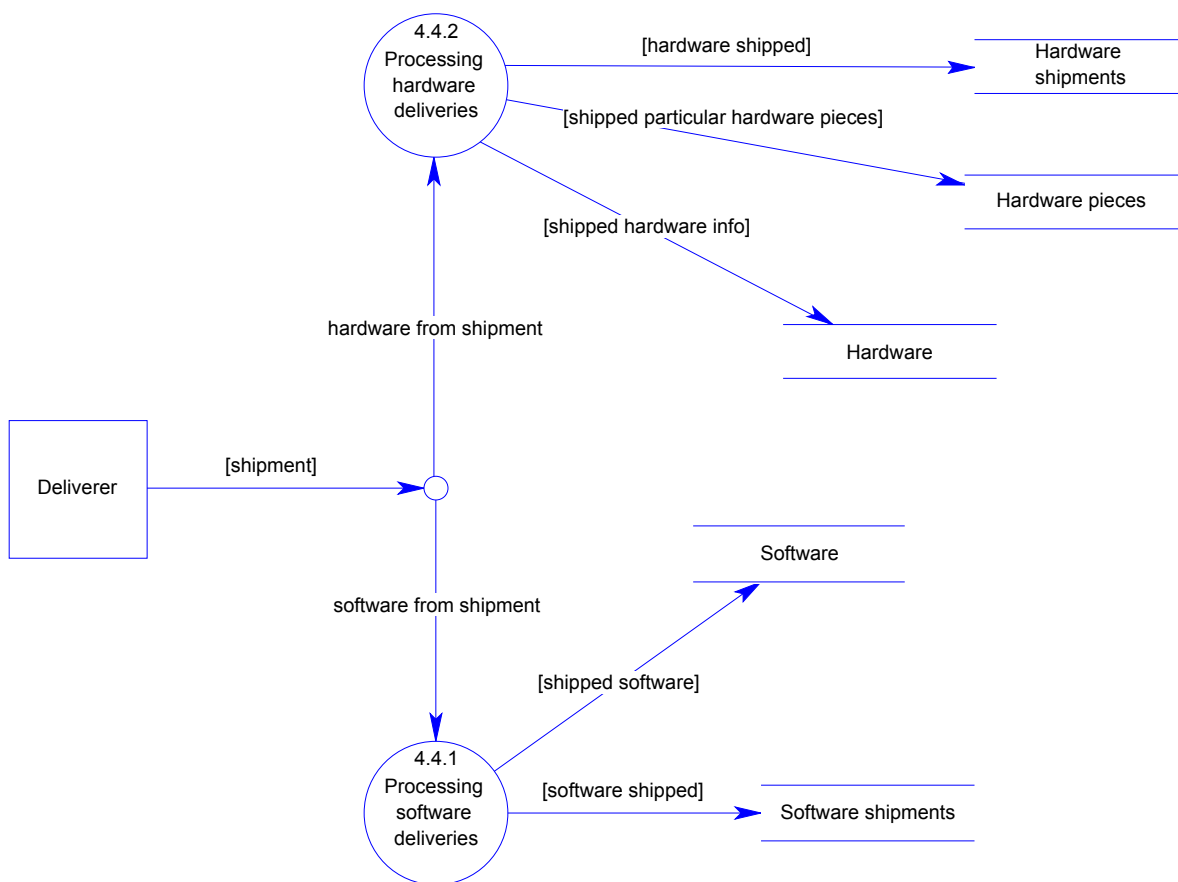
Hierarchy of functions

- 1. Logging into the system**
- 2. Processing customer's order**
 - 2.1. Recording customer details
 - 2.1.1. Checking if customer is in database
 - 2.1.2. Inserting customer into database
 - 2.2. Receiving order
 - 2.2.1. Checking availability of products
 - 2.2.2. Adding products to order
 - 2.3. Preparing invoice for customer
 - 2.4. Handling customer's payment
- 3. Processing complaints**
 - 3.1. Entering complaint data into the system
 - 3.2. Editing and maintaining complaint status
 - 3.3. Informing customer about company's decision
- 4. Stocks & deliveries recording**
 - 4.1. Checking quantity level of products
 - 4.2. Ordering specific products from particular deliverers
 - 4.3. Populating deliverer database
 - 4.4. Processing deliveries
 - 4.4.1. Processing software deliveries
 - 4.4.2. Processing hardware deliveries
 - 4.5. Incoming invoices handling
 - 4.6. Handling deliverers' payments
 - 4.7. Managing sets
 - 4.8. Categorizing products
- 5. Employee' management**
 - 5.1. Populating employee database
 - 5.2. Editing employee data
- 6. Generating reports**
 - 6.1. Generating revenue reports
 - 6.2. Generating complaints report
 - 6.3. Generating custom report

Entities relationship diagram



Process 4.4: Processing deliveries



User/function table

Our system does not have any clear division between typical user and super master user. Instead, each user has some privileges, which are described by number of actions it can access. Below is list of groups and corresponding numbers of privilege:

| | | | | | |
|----|-----------------------------|----|---|----|--|
| 01 | Ability to log in | 07 | Managing users | 13 | Browsing sales/revenues reports |
| 02 | Adding orders | 08 | Managing payments (adding, modifying) | 14 | Super master rights (overrides all rights) |
| 03 | Altering orders | 09 | Managing categories (adding, modifying, deleting) | | |
| 04 | Recording complaints | 10 | | | |
| 05 | Closing complaints | 11 | Managing stocks (adding, modifying, deleting) | | |
| 06 | Browsing complaints reports | 12 | Recording incoming invoices | | |

Considering different user numbered from 1 to 14, provided that each has only one privilege to particular action expressed in its number, user/function table is as follow:

| ACTIONS / USERS | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 |
|------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Log in | F | | | | | | | | | | | | | F |
| Processing orders | | RW | F | | | | | | | | | | | F |
| Processing complaints | | | | RW | F | R | | | | | | | | F |
| Processing payments | | W | | | | | | F | | | | | | F |
| Managing stocks | | R | R | | | | | | | | F | | | F |
| Managing deliverers | | | | | | | | | | | F | | | F |
| Product categorization | | R | R | | | | | | F | | F | | | F |
| Managing users | | | | | | | F | | | | | | | F |
| Managing incoming invoices | | | | | | | | | | | | RW | | F |
| Browsing sales reports | | | | | | | | | | | | | | R |
| Browsing complaints reports | | | | | R | | | | | | R | | | R |
| Browsing revenues reports | | | | | | | | | | | | | R | R |
| Browsing logs | W | | | | | | | | | | | | R | R |

Where:

- R – user can only read, no modification allowed
- RW – user can read and insert new data, but is not allowed to modify existing one
- F – user have full access (read, write and update)

| OUTGOING VAT INVOICES (CODE:OUTGOING VAT INVOICES) | | | | |
|---|------------------------|-------------|-----------------|-------------------|
| Description: Stores internal outgoing invoices | | | | |
| Name | Code | Data type | Null / Not null | Additional |
| no_of_invoice | NUMBER_OF_INVOICE | int | NOT NULL | PK, IDENTITY(1,1) |
| order_id | ORDER_ID | int | NOT NULL | FK |
| invoice_type | INVOICE_TYPE | varchar(30) | NULL | |
| invoice_draw_date | INVOICE_DRAW_DATE | datetime | NOT NULL | |
| invoice_payment_due_to | INVOICE_PAYMENT_DUE_TO | datetime | NULL | |

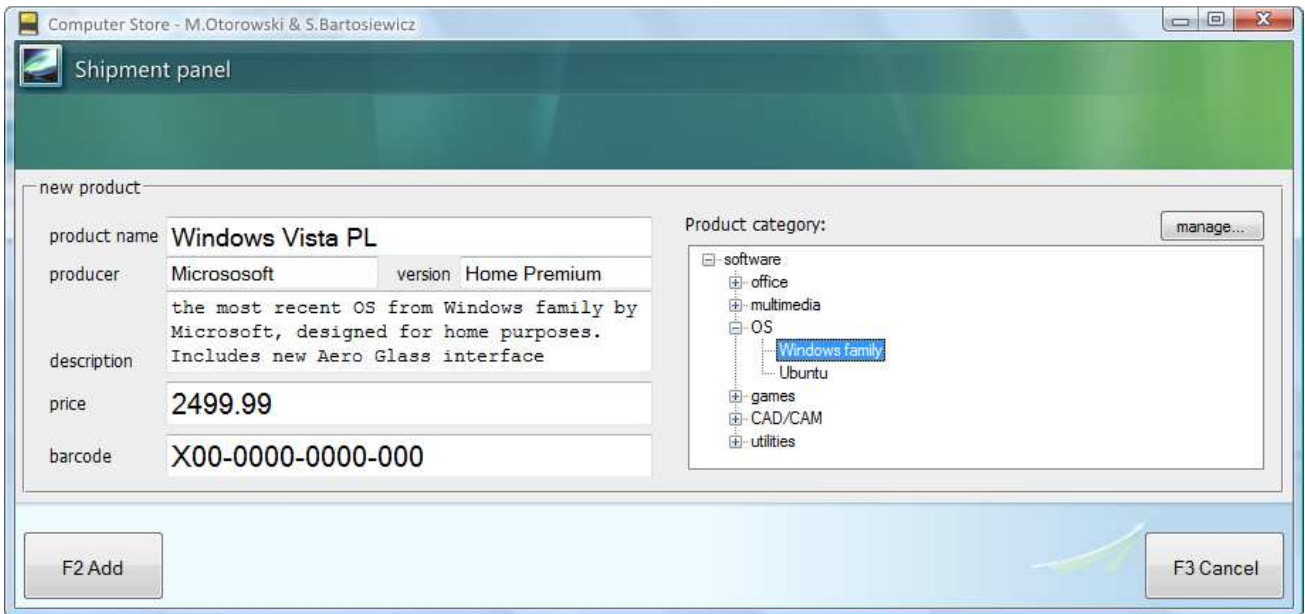
| PAYMENTS FOR EXTERNAL INVOICES (CODE:PAYMENTS_FOR_EXTERNAL_INVOICES) | | | | |
|---|---------------------|--------------|-----------------|-------------------|
| Description: Stores information about payments for outgoing invoices | | | | |
| Name | Code | Data type | Null / Not null | Additional |
| payment_id | PAYMENT_ID | int | NOT NULL | PK, IDENTITY(1,1) |
| no_of_invoice | NUMBER_OF_INVOICE | int | NOT NULL | FK |
| type of payment | TYPE_OF_PAYMENT | char(4) | NULL | |
| datetime of payment | DATETIME_OF_PAYMENT | datetime | NOT NULL | |
| amount_paid | AMOUNT_PAID | money | NOT NULL | |
| external_identifier | EXTERNAL_IDENTIFIER | varchar(255) | NULL | |

| PHYSICAL SETS (CODE:PHYSICAL SETS) | | | | |
|---|----------------------|-----------|-----------------|-------------------|
| Description: Stores information about payments for outgoing invoices | | | | |
| Name | Code | Data type | Null / Not null | Additional |
| set number | SET_NUMBER | int | NOT NULL | PK, IDENTITY(1,1) |
| no_of_set | NO_OF_SET | int | NOT NULL | FK |
| category ID | CATEGORY_ID | int | NOT NULL | FK |
| set_barcode | SET_BARCODE | numeric | NOT NULL | |
| date_of_construction | DATE_OF_CONSTRUCTION | datetime | NOT NULL | |
| availability | AVAILABILITY | int | NOT NULL | |

| PARTS IN SET (CODE:PARTS_IN_SET) | | | | |
|---|------------|-----------|-----------------|-------------------|
| Description: Stores information about what parts are in each set | | | | |
| Name | Code | Data type | Null / Not null | Additional |
| set number | SET_NUMBER | int | NOT NULL | PK, IDENTITY(1,1) |
| no_of_set | NO_OF_SET | int | NOT NULL | FK |
| piece id | PIECE_ID | int | NOT NULL | FK |

Adding new software type

Description: This form is used to add new class of software into database. They will be used as classes later, when shipment comes.




Structure

| N | NAME | TYPE | FORMAT | DESTINATION | OTHER |
|----|------------------|---------|---|--|--|
| 1 | Product category | Tree | String | | From Categories » category name |
| 2 | Product name | Textbox | String | Software » software_name | |
| 3 | Producer | Textbox | String | Software » software_producer | |
| 4 | Version | Textbox | String | Software » software_version | |
| 5 | Description | Textbox | String | Software » software_description | |
| 6 | Price | Textbox | Float | Software » software_price | |
| 7 | Barcode | Textbox | X00-0000-0000-000 (0 – any digit, X – any letter) | Software » software_barcode | |
| 8 | Manage | Button | | | |
| 9 | Add | Button | | | |
| 10 | Cancel | Button | | | |

Behavior

| ELEMENT | EVENT | ACTION |
|-------------------------|------------------------------|--|
| Product category | onclick | Expand / collapse clicked node |
| Manage | click | Opens categories manager dialog |
| Add | mouse: click keyboard: F2 | Checks, if all required fields are specified. If they are, software product is added into database. If not, system shows warning |

Multi-page invoice: middle page



smArt
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Smart Ltd. Otorowski/Marcin, Sławomir Bartosiewicz
ul. Mickiewicza 64, 71-400 Szczecin
NIP: 852-22-00-034


VAT INVOICE: 2008/05/02/03451
SUM FROM PREVIOUS PAGE: 55 Items; 8 788,21 PLN

| NO | NAME OF PRODUCT | QUANTITY | NET PRICE | NET VALUE | VAT RATE | VAT AMOUNT | GROSS VALUE |
|----|--|----------|-----------|-----------|----------|------------|-------------|
| 23 | ArcaVir Antivir with 5 desktop users licence | 4 | 120,20 | 480,80 | 22% | 105,78 | 586,58 |
| 25 | Magix Techno Music Maker 6 | 2 | 200,00 | 400,00 | 22% | 88,00 | 488,00 |
| 26 | HP Deskjet 6C Printer | 3 | 199,99 | 599,97 | 22% | 131,99 | 731,96 |
| 27 | Kingston Flash Mem 4GB | 1 | 211,20 | 211,20 | 22% | 46,46 | 257,66 |
| 28 | Hitachi HD120GB GS-SATA | 2 | 67,11 | 134,22 | 22% | 29,53 | 163,75 |
| 29 | Grand Theft Auto 3 PL | 3 | 30,00 | 90,00 | 22% | 19,80 | 109,80 |
| 30 | ArcaVir Antivir 5 users | 1 | 599,99 | 599,99 | 22% | 132,00 | 731,99 |
| 30 | ASUS USB Mouse | 2 | 120,00 | 240,00 | 22% | 52,80 | 292,80 |
| 31 | Magix Techno Music Maker 6 | 3 | 99,99 | 299,97 | 22% | 65,99 | 365,96 |
| 32 | HP Deskjet 6C Printer | 1 | 49,99 | 49,99 | 22% | 11,00 | 60,99 |
| 33 | Kingston Flash Mem 4GB | 2 | 19,90 | 39,80 | 22% | 8,76 | 48,56 |
| 34 | Hitachi HD120GB GS-SATA | 3 | 100,00 | 300,00 | 22% | 66,00 | 366,00 |
| 35 | Drucezek 3.14 (2008) | 4 | 3 400,00 | 13 600,00 | 22% | 2 992,00 | 16 592,00 |
| 36 | OpenOffice.org CD | 1 | 20,00 | 20,00 | 22% | 4,40 | 24,40 |
| 38 | MS P/S2 Keyboard | 3 | 65,00 | 195,00 | 22% | 42,90 | 237,90 |
| 39 | School & University set | 4 | 89,00 | 356,00 | 22% | 78,32 | 434,32 |
| 40 | 602 Office Suite | 5 | 100,00 | 500,00 | 22% | 110,00 | 610,00 |
| 41 | Logitech WebCam C123 | 6 | 50,00 | 300,00 | 22% | 66,00 | 366,00 |
| 42 | Microsoft Web Express 2008 | 2 | 55,65 | 111,30 | 22% | 24,49 | 135,79 |
| 43 | Total Commander | 3 | 99,99 | 299,97 | 22% | 65,99 | 365,96 |
| 44 | Autodesk Map 2008 STU | 1 | 199,99 | 199,99 | 22% | 44,00 | 243,99 |
| 45 | Hitachi HD120GB GS-SATA | 2 | 211,20 | 422,40 | 22% | 92,53 | 515,33 |
| 46 | Grand Theft Auto 3 PL | 3 | 67,11 | 201,33 | 22% | 44,29 | 245,62 |
| 47 | ArcaVir Antivir 5 users | 1 | 30,00 | 30,00 | 22% | 6,60 | 36,60 |
| 48 | ASUS USB Mouse | 2 | 599,99 | 1 199,98 | 22% | 264,00 | 1 463,98 |
| 49 | Magix Techno Music Maker 6 | 3 | 120,00 | 360,00 | 22% | 79,20 | 439,20 |
| 50 | HP Deskjet 6C Printer | 1 | 99,99 | 99,99 | 22% | 22,00 | 121,99 |
| 51 | Kingston Flash Mem 4GB | 2 | 49,99 | 99,98 | 22% | 22,00 | 121,98 |
| 52 | Hitachi HD120GB GS-SATA | 1 | 19,90 | 19,90 | 22% | 4,38 | 24,28 |
| 53 | Drucezek 3.14 (2008) | 2 | 100,20 | 200,40 | 22% | 44,09 | 244,49 |
| 54 | OpenOffice.org CD | 3 | 3 400,00 | 10 200,00 | 22% | 2 244,00 | 12 444,00 |
| 55 | ASUS USB Mouse | 1 | 20,00 | 20,00 | 22% | 4,40 | 24,40 |
| 56 | Magix Techno Music Maker 6 | 2 | 32,00 | 64,00 | 22% | 14,08 | 78,08 |
| 57 | HP Deskjet 6C Printer | 3 | 65,00 | 195,00 | 22% | 42,90 | 237,90 |
| 58 | ASUS USB Mouse | 1 | 89,00 | 89,00 | 22% | 19,58 | 108,58 |
| 59 | Magix Techno Music Maker 6 | 2 | 20,00 | 40,00 | 22% | 8,80 | 48,80 |

SUM ON THIS PAGE: 142 items
TOTAL VALUE: 41 122,39 PLN

Page 2 of 3

Multi-page invoice: last page



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Smart Ltd. Otorowski/Marcin, Sławomir Bartosiewicz
ul. Mickiewicza 64, 71-400 Szczecin
NIP: 852-22-00-034

VAT INVOICE: 2008/05/02/03451
SUM FROM PREVIOUS PAGE: 142 Items; 41 122,39 PLN

| NO | NAME OF PRODUCT | QUANTITY | NET PRICE | NET VALUE | VAT RATE | VAT AMOUNT | GROSS VALUE |
|------------|--|----------|-----------|-----------|----------|------------|-------------|
| 60 | ArcaVir Antivir with 5 desktop users licence | 4 | 120,20 | 480,80 | 22% | 105,78 | 586,58 |
| 61 | Magix Techno Music Maker 6 | 2 | 200,00 | 400,00 | 22% | 88,00 | 488,00 |
| 62 | HP Deskjet 6C Printer | 3 | 199,99 | 599,97 | 22% | 131,99 | 731,96 |
| 63 | Kingston Flash Mem 4GB | 1 | 211,20 | 211,20 | 22% | 46,46 | 257,66 |
| 64 | Hitachi HD120GB GS-SATA | 2 | 67,11 | 134,22 | 22% | 29,53 | 163,75 |
| SUM | | 154 | | 42 948,58 | | 12 219,11 | 55 167,69 |

| | |
|-------------------------------|---|
| Amount to pay | 55 167,69 |
| Amount to pay (verbal) | Fifty-five thousand one hundred sixty seven złotych and sixty-nine groszy |
| Type of payment | Cash / Bank transfer |
| Deadline | 21 Jul 2008 |

Authorized to draw
Janusz Kowalski

Authorized to receive

Page 3 of 3

Structure

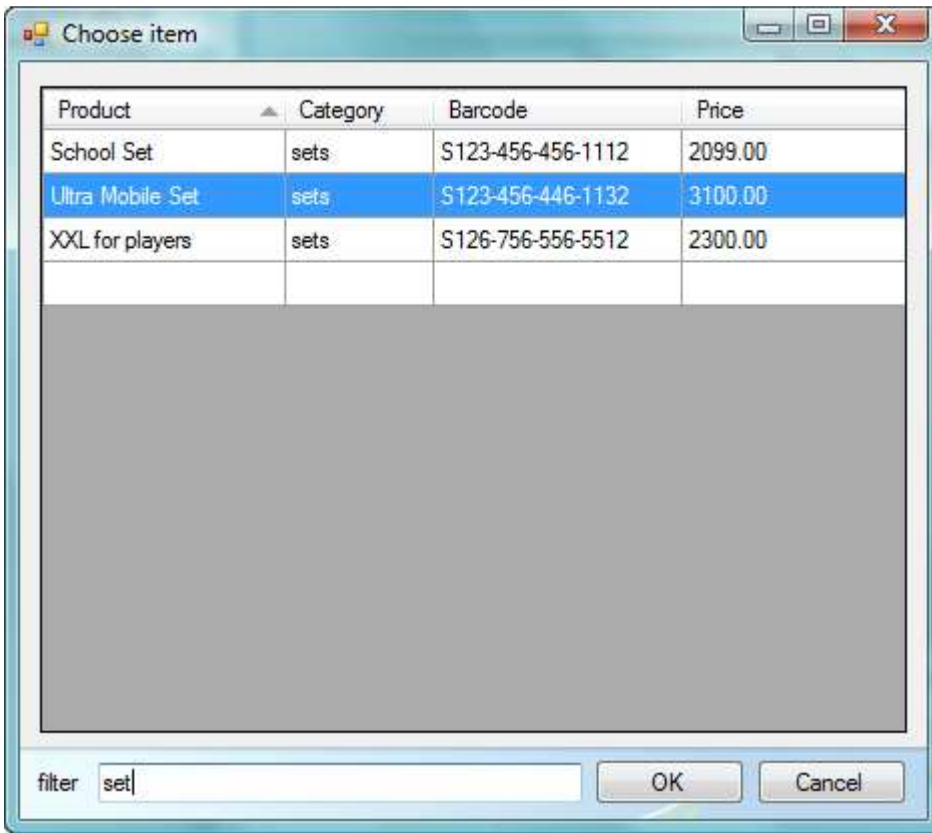
| N | NAME | FORMAT | SOURCE |
|---|-------------------|-------------------|---|
| 1 | Invoice number | 0000/00/00/00000 | Outgoing VAT Invoices » <i>no_of_invoice</i> |
| 2 | Draw date | DD MMM YYYY HH:MM | Outgoing VAT Invoices » <i>invoice_draw_date</i> |
| 3 | Transaction date | DD MMM YYYY HH:MM | Orders » <i>order_draw_date</i> |
| 4 | Purchaser name | String | Customer individuals » <i>individual_name, individual_surname</i> or Customer companies » <i>company_name</i> |
| 5 | Purchaser address | String | Customer individuals » <i>individual_address</i> or Customer companies » <i>company address</i> |
| 6 | Purchaser NIP | 000-00-00-000 | Customer companies » <i>company_TAX_NO</i> |
| 7 | Name of product | String | Order lines » <i>product_name</i> |
| 8 | Quantity | Integer | Order lines » <i>product_quantity</i> |

Behavior

| ELEMENT | EVENT | ACTION |
|---------------------|--|--|
| New customer | mouse: click | Open window to add new customer |
| Views | mouse: click | Allow to choose which columns to show (from Customer number, Name, Address, NIP) |
| Filter | on key up | Filter list, according to criteria specified in "filter mode" field. |
| Select | mouse: click (if focused) pressed enter | Checks, if any customer was selected. If yes, system returns data of this customer to parent window. If no customer was selected, system shows warning, that nothing was selected. |
| Cancel | mouse: click (if focused) pressed enter | Closes window and cancel choosing customer |

Item selection window

This is item selection window. It is used primarily for administrative purposes, like editing products. Note, it is used for all kind of products.



Structure

| N | NAME | TYPE | FORMAT | OTHER |
|---|----------|-----------|--------|--|
| 1 | Products | Data Grid | | From "software", "hardware", "sets" and "categories" table |
| 2 | Filter | Textbox | | |
| 3 | Ok | Button | | |
| 4 | Cancel | Button | | |

Behavior

| ELEMENT | EVENT | ACTION |
|---------|--|---|
| Filter | onkeyup | Filters grid according to content of this field. |
| OK | mouse: click pressed enter | Chooses selected products and return data to parent window. |
| Cancel | key press: ESC mouse: click (if focused) pressed enter | Closes this window |

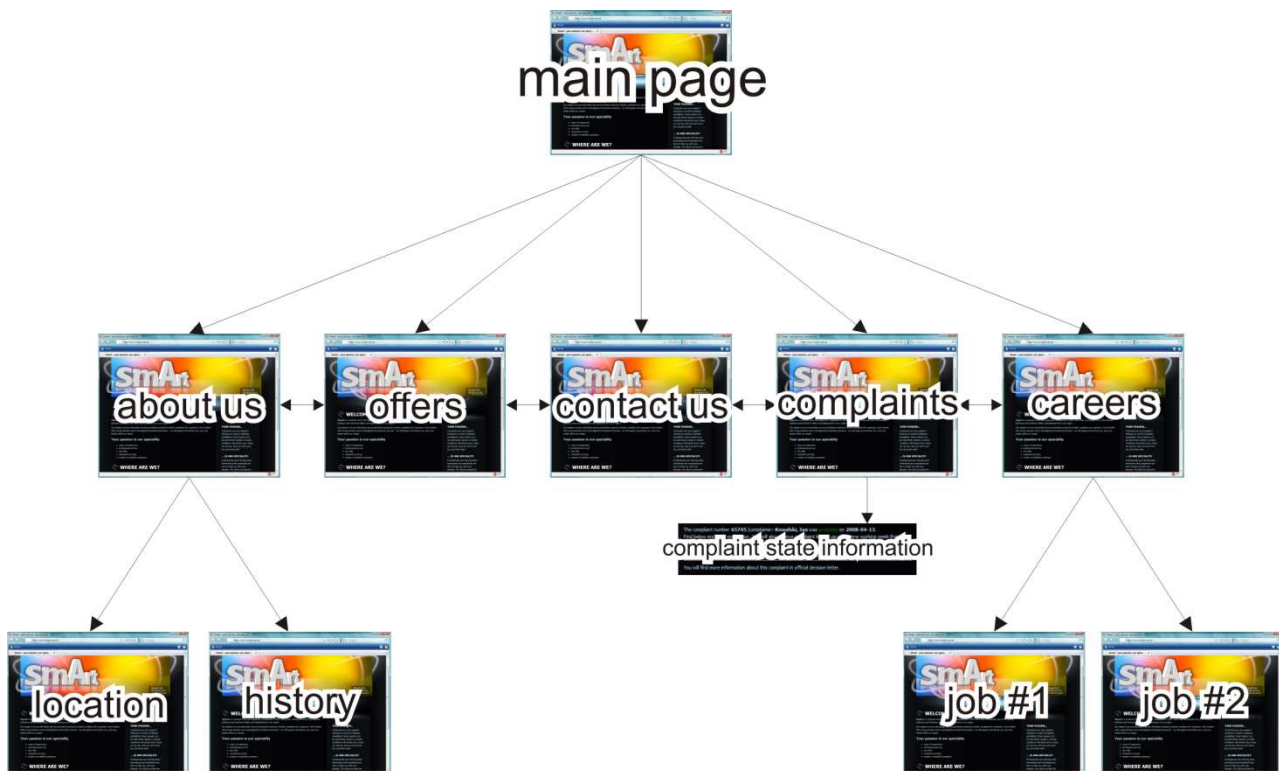
| | | | |
|--|--|--------------------|--|
| | | individual_surname | |
|--|--|--------------------|--|

4. Complaint was not found

The complaint number 65745 was not found. Please, check spelling.

Navigation between pages

This graph represents the way user can navigate within Smart website. Main page is a home page, having the same navigational menu as other website. It means, that user can go from any point to one of six top-level pages (main, about, offers, contact us, complaints, careers) by clicking on main menu. Access to other pages is embedded in parent pages in structure.



| File/php server | |
|------------------------|---|
| Model | HP ProLiant ML370 G5 Quad Core E5345 Tower Server System 470064-551 |
| CPU | Quad Core Intel Processor E5345 (2.33GHz) 1333 FSB |
| Memory | 4 GB (2 x 2 GB) PC2-5300 DDR2-667 Fully Buffered |
| Storage | Smart Array P400 Controller with 256MB cache (RAID 0/1/1+0/5), DVD-ROM |
| Networking | Embedded Dual NC373i Multifunction Gigabit NICs |
| SHARED | |
| UPS | Ever sinline pro 5000 (UPS #1) (shared between database and file/php server) |

Software

| Purpose | Software |
|---|--|
| Database server | Windows Server 2008 MS SQL Server 2008 |
| File/www server | Windows Server 2008 |
| Workstations (workstations #1-3) | Microsoft Windows Vista Business 64-bit Microsoft Office 2007 Computer store SMART software Mozilla Firefox 3 Mozilla Thunderbird 2 |
| Manager workstation (workstation #5) | Microsoft Windows Vista Business 64-bit Microsoft Office 2007 Computer store SMART software Seagull BarTender Basic 8 Barcode Software Mozilla Firefox 3 Mozilla Thunderbird 2 Any accountancy program (for instance Ramzes) |
| Workhouse workstation (workstation #4) | Microsoft Windows Vista Business 64-bit Microsoft Office 2007 Computer store SMART software Seagull BarTender Basic 8 Barcode Software Mozilla Firefox 3 Mozilla Thunderbird 2 |

Implementation tools

These are tools, that are required to fulfill project and process of implementation:

| Tools | Purpose |
|---|---|
| Microsoft Visual C# 2008 | Design and programming of standalone window GUI |
| Sybase PowerDesigner 2008, PowerDesigner ProcessAnalyst | Design data flow diagram, entities diagram, database structure |
| Corel Photo-Paint X3 | Project of graphical elements, icons, backgrounds, website template and conceptual artworks |
| MSSQL Server 2008 Enterprise | Maintaining database |
| .NET Framework 3.5 | Realization of visual effects in interface |
| Mozilla Thunderbird 2 | Maintaining e-mail account |
| Ghost Script 6 | Used to generate PDF files |
| MS Excel 2003 Viewer | To view generated spreadsheets |

Implementation schedule

Stages:

| No. | Activity | Person/Company |
|-----|--|---------------------|
| 1 | Comissioning a firm to write a SMART Computer Shop programme | Separate entity |
| 2 | Comissioning a firm to create a website | Separate entity |
| 3 | Hardware testing | 2 persons |
| 4 | Conversion of the previous database to the new model | 1 person |
| 5 | Creating a network | 2 persons |
| 6 | Network testing | 2 persons |
| 7 | Software installation on the computers and conecting it with databases | 1 person |
| 8 | Hardware and software testing | 2 persons |
| 9 | Employee training | 1 person+ employees |

Schedule of implementation:

