

# **CASE tools for business process analysis in software engineering**

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## **VZOROVÝ PODKLAD PRO ZADÁNÍ BAKALÁŘSKÉ PRÁCE**

### **NÁZEV TÉMATU:**

CASE tools for business process analysis in software engineering.

### **VEDOUcí PRÁCE:**

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### **ZÁSADY PRO VYPRACOVÁNÍ:**

The object of this work is to analyze available software tools used in analysis in the software engineering. The output of this work will be summary of detailed comparison among the most common CASE tools from the view of their capabilities, accessibility and purpose. Specifically:

1. Compare User Interface of each tool from practical user view
2. Exceptions and differences, advantages and disadvantages
3. User administration (settings possibility)
4. Documentation
5. Security and error-handling, risk management
6. Support – new releases, extensions, customer care, communicability
7. Compare community and popularity for each tool
8. Hardware demands, price and delivery

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## ABSTRACT

In my thesis I want to compare CASE tools used primarily in Business Analysis. These tools allow user to create models of processes or systems (which may be very huge in accordance with enormous systems of banks or telecommunication companies), and in accordance with UML (Unified Modeling Language of business analysis) illustratively suggest the solution which may be well-understood by TOP Management as also by developers or testers, who physically create the solution.

Thanks to these tools the comprehensible communication among parties involved in development process is successfully reached.

### Keywords:

CASE tool

Business Analysis

UML

## ABSTRAKT

Ve své bakalářské práci hodlám porovnat tzv. CASE nástroje používané převážně v Business Analýze. Tyto nástroje se používají především na modelování systému či procesů (jejichž složitost může být velmi náročná vzhledem ke komplexnosti dnešních systémů), pomocí grafických jazyků (UML), kterým následně porozumí jak TOP Management, který zadává celý problém, stejně jako programátoři či testeři, kteří celé řešení vyvíjejí a testují.

Tím je dosaženo srozumitelné a vystižné komunikace mezi specifickými skupinami lidí podílející se na celkovém zpracování projektu či systému.

### Klíčová slova:

CASE nástroj

Business analýza

UML

## Foreword

I would like to thank CLEVERLANCE a.s. for providing me fully authorized products Enterprise Architect and Microsoft Office Visio, ZOOM INTERNATIONAL a.s. for providing me fully authorized product UModel and Visual Case and John Nash with Russell Abisla from Visible Systems who helped me with downloading and learning trial version of Visible Analyst.

I would also give thanks to Smětala Consulting s.r.o. for general advice and support.

Prohlašuji, že jsem na bakalářské práci pracoval samostatně a použitou literaturu jsem citoval. V případě publikace výsledků, je-li to uvolněno na základě licenční smlouvy, budu uveden jako spoluautor.

I declare that I worked individually on my thesis and quoted used literature. If results are going to be published and if it is in accordance with license contract terms, I will be introduced as a co-author.

Ve Zlíně

.....  
Podpis diplomanta

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## INTRODUCTION

The understanding of information systems in their entirety is still a big problem in our advanced-technology world. Systems became very complex (e.g. systems of banks or telecommunication operators) that for their detailed description exists hundreds of documents. To understand such system entirely is impossible for human brain. However it is necessary once in a time to do some major change in this system or to build complete new advanced version. In this case it is inevitable to understand the problem and describe it before the whole development process is about to start. For this purpose is used business analysis.

Business analysis is thus focusing on understanding of current solution (if exists) and drafting new solution in accordance with customer's requirements. It uses many visual programs which describes some specific part of system and models this imaginary and easy-understanding solution for all participating parties (customer, programmers, testers, architects etc.). Business analysis uses so-called CASE tools specially designed for modeling of imaginary solution (use specific graphic language; the most common is UML – Unified Modeling Language).

The main purpose of this thesis is to help future analysts with choosing of most common CASE tools of business analysis and to extend their general knowledge of analysis.

## **I. THEORETICAL PART**

## 1 INTRODUCTION TO ANALYSIS

### 1.1 What is analysis

Analysis can be defined as:

*A discipline focused on identifying requirements in the context of helping organizations to achieve strategic goals through internal changes to organizational capabilities, including changes to policies, processes, and information systems. [6]*

Analysis concentrates on improving development process of software in terms of speed, finance and quality.

Business Analysis mainly concentrates on:

- Mutual understanding of the problem (prevents from misunderstanding) among all participated parties (programmers, customers, testers, external workers etc.)
- Defines a range of solution and identifies actual requirements
- Creates simplified view of complete solution
- Maintains and creates conditions for controlling of further changes
- Concentrates on improving of drafted solution from the customer's and programmer's point of view

Technically, business analysis simplifies main problem on smaller and easy-to-understand parts which subsequently specifies using CASE tools and graphic languages (UML) determined for this purpose.

### 1.2 Origin and history of Business analysis

Determine the origin of business analysis is very complicated. There are speculations that principles of business analysis are apparent in time before Christ when people painted their manufacturing processes on any objects available (e.g. ancient Egyptian civilization

which built pyramids outlined their methods on papyrus or stone). However, other speculations assert that business analysis concentrates on separation to specialized roles, determination of methods to improve the product and accelerate the production.

Officially the roots of business analysis have been found in Adam Smith's process on pin production in year 1776. Mr. Smith outlined identification of steps which had specialized roles. This advancement improved the production rapidly. [8]

During the end of 19<sup>th</sup> century, Mr. Henry R. Towne and Frederick Winslow Taylor came with revolutionary business management concept (also called as science management or "Taylorism"). This concept concentrated on mapping of processes, planning and training of employees on optimal level. Many world famous personalities used Taylorism in their companies (e.g. Henry Ford who used business management to improve the production of cars).

In 1896, the famous economist Vilfredo Pareto came with idea that 20% of population owns 80% of possessions. From this thinking was formed main goal of Business analysis – to concentrate on 20% of functionality which brings 80% of the result. [history analysis]

During 50's and 60's the Software Engineering term became more publicly familiar and started to be generally used. With more and more sophisticated software programming became necessity to improve also business analysis – creation of disciplines which simplifies and eases production process.

Also during these years first Software crisis emerged [1]. The failure of many expensive production projects which caused great losses laid down the roots of this crisis. The "fever" for perfect process which could minimize or directly eliminate these mistakes is affecting whole IT industry. Many software engineering processes were created in this time and caused the chaos thank to no universal process for software developing does not exists even today.

The most famous software engineering process from latest 60's is Waterfall Process (also known as Sequential Process) of Winston Royce – see Figure 1. Its principle resides in strict sequence of Business analysis, design, implementation and finally integration. First to understand and identify the problem by Business Analysis, than create a design which is more detailed architectural draft of solution. The third and probably longest step is implementation which represents work of developers with testing and finally fourth step represents integration of complete solution.

The process which W. Royce created in quiet simply in compare with nowadays Waterfall process, but the principle is the same.

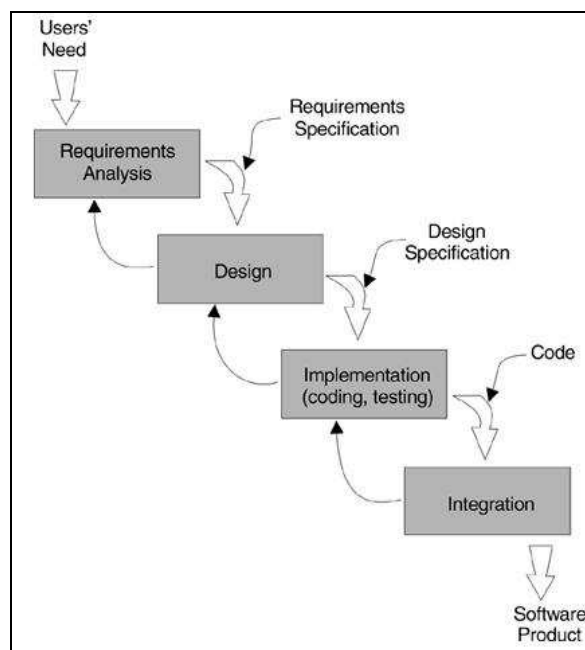


Figure 1 – Waterfall process [4]

Mr. W. Royce created also other software development processes and the second which I want to mention is probably the best of all (however in 60's overlooked). It is an Iterative process, which is heavily used even today (of course with many modifications). This process use iterations which represents small over-repeating modified Waterfall processes – see Figure 2.

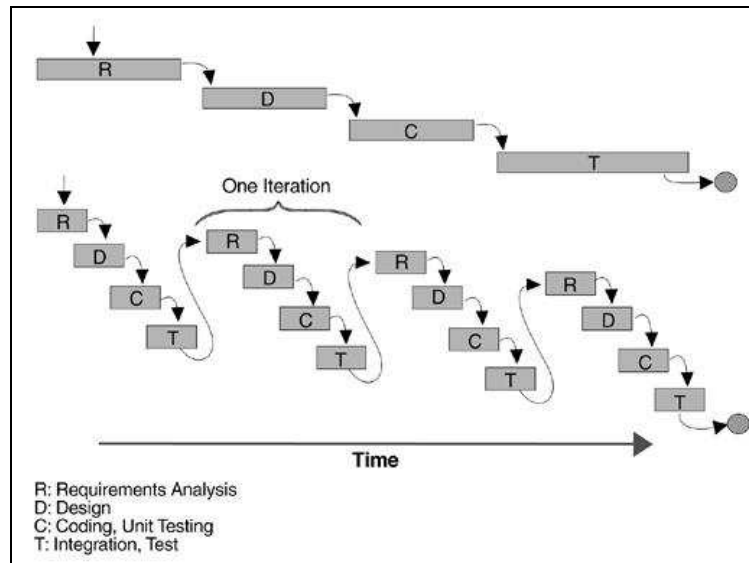


Figure 2 – Iterative Process [4]

During 70's and 80's the evolution of Internet domains. Many other software development processes and methodologies were created (SSADM, Scrum, RUP, PRINCE2 etc.) with organizations (CCTA) which concentrates on extending and conducting of process development.

In 1997 three men Grady Booch, James Rumbaugh and Ivar Jacobson contributed to world with Unified Modelling Language (UML) which rapidly replaced other standards generally used until that time.

One year later was created the nowadays' most common software engineering process – Rational Unified Process (RUP):

Official Definition:

*Rational Unified Process provides a disciplined approach to assigning tasks and responsibilities within a development organization. Its goal is to ensure the production of high-quality software that meets the needs of its end users within a predictable schedule and budget. [6]*

The Rational Unified Process captures many of the best practices in modern software development in form that is suitable for a wide range of projects and organizations. [4]

### 1.3 Dot-com crisis – underestimation of Business Analysis

On the turn of 20<sup>th</sup> and 21<sup>st</sup> century arises in western countries a Dot-com effect (also known as Dot-com crisis [8]). Fast progress in IT technologies – primarily of the Internet, was main trigger of this crisis. Companies which provided Internet services had great success and their stocks rose rapidly up. Also other similar companies, which only began, had no problem with finding finances from effect-influenced investors.

However, the first problem of these brand new companies was lack experiences and great financial potential. Analysis of processes, punctual and correct communication with customer and many other essential aspects were underdeveloped or missing. The second problem was chaotic arrangement in accounting – from first point of view these companies were looking as very profitable. The Bubble on stock market had begun to grow bigger. Finally it snapped leaving many bankrupted companies and huge sum of debts.

After Dot-com crisis, most strong companies had concluded to outsource IT experts and projects to protect themselves against other fluctuations in IT sphere.

This example is evident proof what may happen, if there is weak or no business analysis during important IT projects. Fortunately, still more and more companies over the world realises this importance of Business analysis and fear not to invest big amount of money to save much more in the end.

### 1.4 Who is Business analyst

There are many definitions of Business analyst, so I introduce the most common one covering the broadest spectrum of work and responsibilities:

*A business analyst works as a liaison among stakeholders in order to elicit, analyze, communicate and validate requirements for changes to business processes, policies*



*and information systems. The business analyst understands business problems and opportunities in the context of the requirements and recommends solutions that enable the organization to achieve its goals. [6, 7]*

It implies from definition that many companies use quite a lot the services of Business analysts – mainly for control, orientation and complete improvement of projects. The analysts is concentrating on value of business output during the whole project – so even before investing in project and even after deployment to customer.

The position of the Business analyst is even more attractive thanks to following opportunities:

- Systems are becoming more and more complicated
- The number of requests for changes during the project is increasing
- New sophisticated methodologies are arising
- Whole IT world is still developing itself in increasing speed, so system updates and creation of new ones is always a matter of time

Among common responsibilities of Business analyst belongs following:

- Communication with customers and leaders of development
- Processing of documents which describes principle of project's processes
- Record of needs of all attended sides – after the requirements are created
- Creation and maintenance of “analysis” model of system or solution in actual version
- Modeling of business processes in organization
- Understanding of restrictions both organizational and technical
- Risk management control
- Data analysis

- Learning the dependencies among each part of the project or system
- Showing work progress of participated parties to project managers

Basic skills of analysts:

- Ability to negotiate and other communication skills
- Orientation in IT (programming, operating systems, technologies, methodologies) and software development processes (RUP, Scrum, Extreme programming etc.)
- Knowledge of UML and other graphic languages of analysis (BPMN)
- Creative thinking and self-confidence

## 2 CASE TOOLS

### 2.1 What is a CASE tool?

Modern business analyst can't go without wide range of software tools and knowledge. Nowadays complicated systems require usage of sophisticated tools capable of handling such information in desired form and work with them is not difficult or slow. Most of this represents CASE tools.

#### Definition:

*A CASE tool is a computer-based product aimed at supporting one or more software engineering activities within a software development process. [5]*

This general definition covers quite wide range of testing, compiling, designing and analyzing tools. So in analysis we use CASE tools which are capable to model easily processes or diagrams as also modify diagrams or export data to source code of many computer languages. The UML is the most common language for modeling (see chapter 2.2).

### 2.2 Unified Modeling Language (UML)

UML is modeling language which is used to describe the system. It consists of entities, diagrams and other elements (in UML are called notations). Behind every element is semantics, which describes what particular element means. [5]

Connected elements create diagrams, connected diagrams create models and connected models create imaginary description of system behavior.

There are many modeling notations, but UML is most popular because of following advantages:

- It describes all important aspects of system
- It is formal language, so there is no space for misunderstanding
- It can be used for small projects as well as for massive system modeling

- UML is controlled by an open standards group, it contains best practices of object-oriented community during past 15 years

Example of UML in use created in Enterprise Architect:

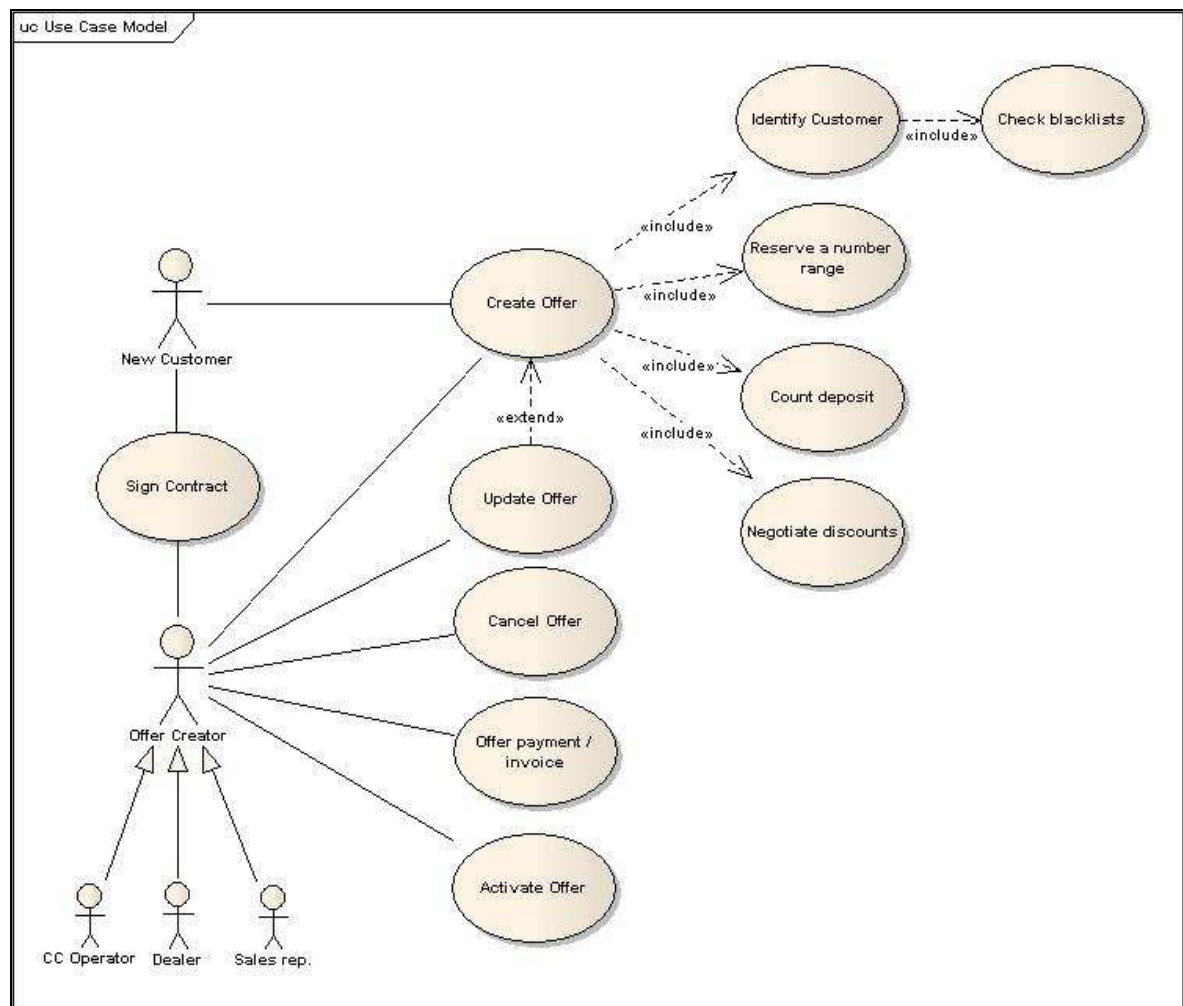


Figure 3: UML Use Case diagram

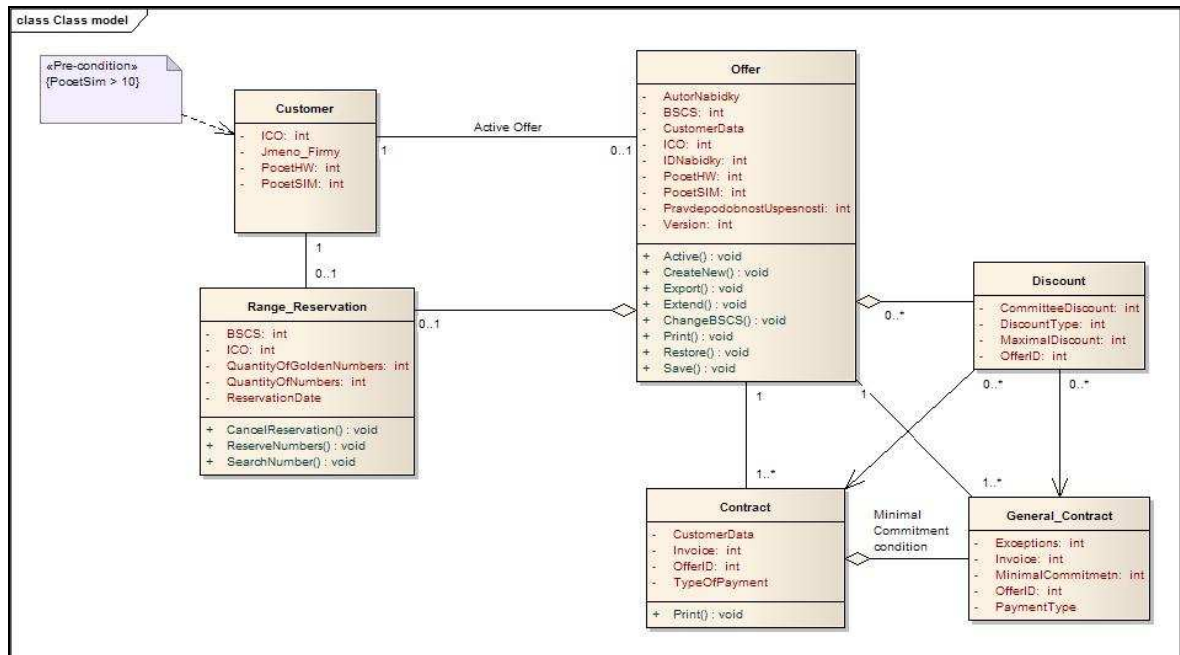


Figure 4: UML Class diagram

### 2.3 CASE tools in use

From definition follows, that CASE tools are generally used for both programming and analysis (possibly also for testing and other parts of software development process). CASE tools differ primarily in inputs and outputs.

For CASE tools used in analysis may be following inputs:

- Process from which the model is up to be created
- Requirements intended for further processing
- User documentation
- Architecture of the system
- Models intended to be further changed or processed
- UML diagram intended to be upgraded and other

In CASE tools Is possible to:

- Create virtual graphical models

UML notation defines more than 15 kinds of diagrams (e.g. sequential diagram, class diagram, state machine, use case diagram etc.) which can be mutually connected – one change in one diagram may change automatically other (connected) diagram without user's intervention.

- Create data models using entities and relationships
- Create a model of databases which is possible to use for generation SQL queries and more

CASE tools play very important role in software development process. Their ability to connect many different technologies to one diagram or model is very appreciated especially if several teams work separately on the project and sharing of results may be critical to decide about the success of the project. The practical part of this thesis concentrates to describe the most common CASE tool from Business analyst's point of view.

## **II. PRACTICAL PART**

### 3 ENTERPRISE ARCHITECT

Enterprise Architect is CASE tool produced by Sparks Systems Company ([www.sparxsystems.com](http://www.sparxsystems.com)). This tool is suitable for beginners as also for professional analysts.

Sparx Systems were constituted by Geoffrey Sparx in 1996 in Australia. First version of Enterprise Architect was released in August 2000. Current version is 7.1 (which I describe here) and estimated number of registered users is more than 100 000 over the world.

There are three editions:

- Desktop Edition – suitable for individual analysts/developers. Contains basic functions.
- Professional Edition – fully featured modeling environment, multi-user support.
- Corporate Edition – database features and security advantages.

Tested version: Enterprise Architect 7.1 (Corporate Edition)

Web page: <http://www.sparxsystems.com.au/ea.htm>

#### 3.1 General strengths

- High popularity – diagrams from EA are commonly known, easy to share EA projects.
- Supports of generation and reverse engineering of source code in many languages (C++, C#, Delphi, Java, PHP, Python, ActionScript, Visual Basic and Visual Basic .NET). This feature is very useful when creating analysis documentation during development. Source files containing mostly hundreds of classes may be automatically generated into diagram and than just updated by analyst into well-arranged expression (continuity is maintained).



- Spell checker – provides intuitive control of grammar. Useful when creating models in different language.
- Traceability of changes (auditing feature) – this feature enables to control all changes in model even shared through many users.
- Multi-user tool – it is possible to create multi-user structure, where is administrator and users with privileges. This feature creates save and organized environment in team-based projects.
- Locking feature providing secure work in teams – this feature relates with security, every user may ‘lock’ its diagram so no other user (except user with special privileges) may change this diagram.
- Testing and Project Management support – it is possible to test how components in a model work together. Project Management provide user with possibility to estimate project size, human resources, risks, maintenance and effort. These features are unique through all CASE tool spectrums.
- Brilliant User Interface – intuitive, fast, many features and possibilities (see chapter 3.3).
- CVS support – it is possible to control changes in shared diagrams so every user sharing this diagram see, what changes have been made and by whom. Practically only in teams may be used this feature.
- Supports UML 2.1 – the newest version of this standard includes some new diagrams and entities, which are already included in EA too.

### 3.2 General disadvantages

- Update option is missing – user is warned when new big version is launched (e.g. from EA 6.0 to 7.0), but for smaller versions (7.1) has to search on web.
- User interface could be more sophisticated – should use more icons for visualization (primarily when creating project), offer more examples and advice if needed, however working in EA is for experienced user very fast and intuitive.

- Code generation and reverse engineering should have more sophisticated help – it is quite complicated process even for IT professionals.

### 3.3 User Interface

- Transparency – even with very complex diagrams it is possible to edit and add items without problems and confusedness.
- Possibility to add plug-ins for your favorite IDE (e.g. Eclipse, Visual Studio) – this feature is also primarily for developers who develop in Eclipse and may use their work. I was not able to test this feature because I do not have Eclipse or Visual Studio, however I read in discussion [8] that it is almost doesn't make any difference if plug-in is used or not.
- Possibility to modify toolbars and menus – user may change the order in toolbars or menus, or create new tab where are all most-used features he use.
- Syntax Control feature which enables user to edit proper UML diagrams – this is integrated in UI. It can not happen that user can edit or create UML diagrams which violates with UML standard.
- Easy and fast traceability of changes in every model – this is quiet standard (except Visible Analyst), user may trace its changes endlessly.
- Test – Use Case diagram created within 6 minutes.

### 3.4 User Administration

In EA user can manage very serious changes which means, can simply bend the program for its own illusions. User may define its own profile, if EA is used by more other users. Version control is supported for CVS and SVN.

### 3.5 Documentation

There is wide range of supportive documentation for EA (supports WYSIWYG template):

- Demonstrative tools – in form of presentation or flash animation on Sparx's web site.
- Rich online support – discussions, forum, advisory centre.

### 3.6 Security

- Privilege system is used (different user, different permissions)
- Possibility to set user-administrator with special permissions – administrator usually manages privileges of other users – good for team-work analysis.
- Locking of diagrams and models for user and user-groups – this feature enables to lock diagram or model so no other user without unlocking password is able to make any changes.
- Version Control feature to secure sharing and updates of users.

### 3.7 Author's opinion

Enterprise Architect is powerful tool suitable for small project as also for huge project consisting of many correlated diagrams created by several Analysts. Also EA with its debugging, testing, project management features is designated for developers, testers and project managers. So it is possible to use Enterprise Architect in teams consisted of many different professions and still have consistency of documents and models.

Working with EA is easy and fast, however sometimes too many possibilities are offered.

### 3.8 Screens

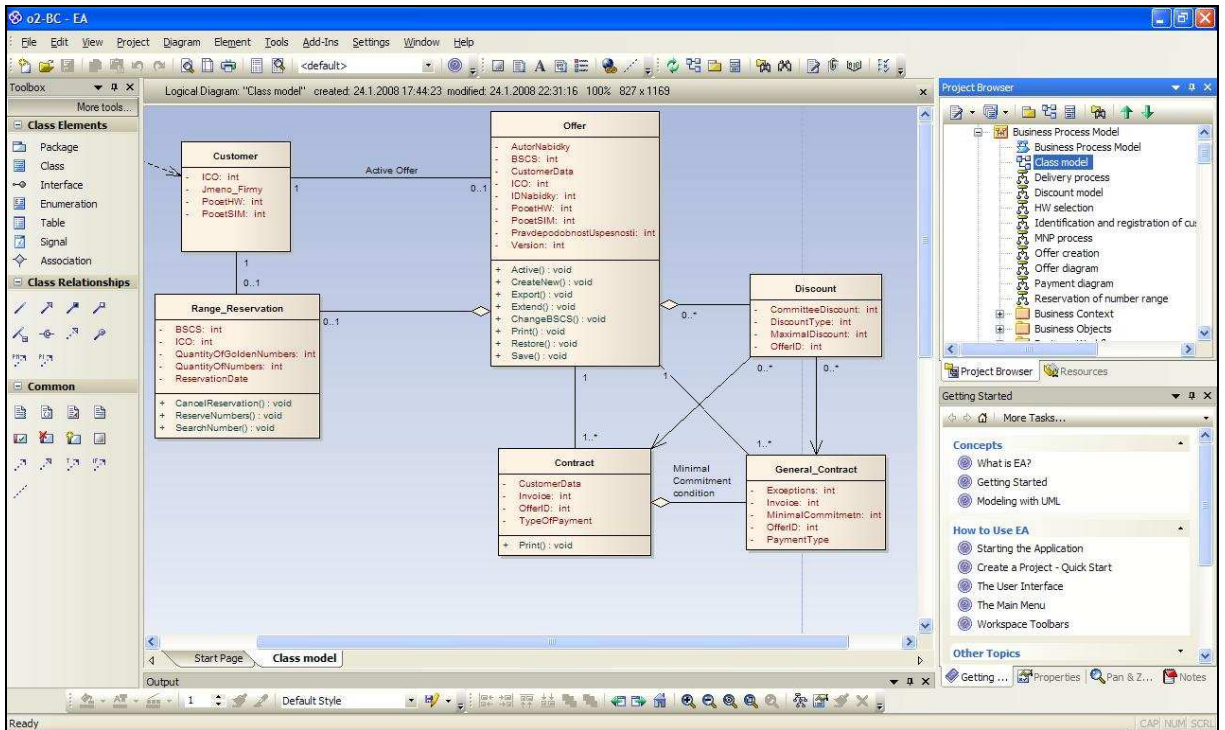


Figure 5: Enterprise Architect - Class diagram

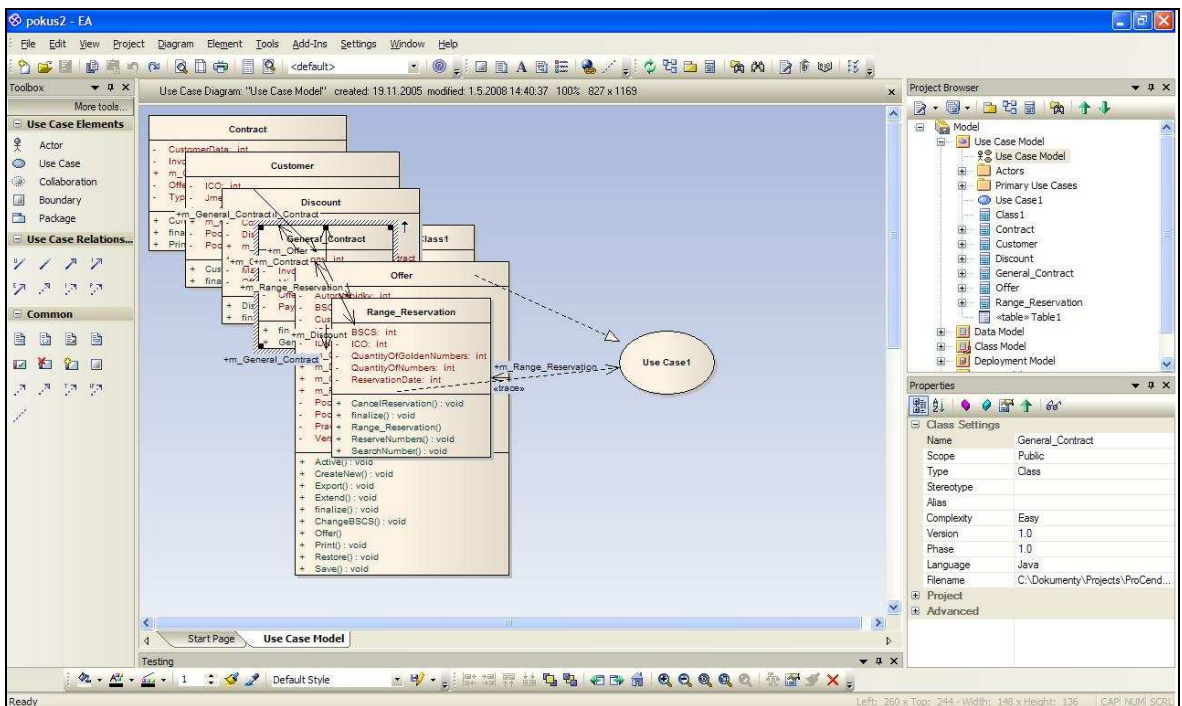


Figure 6: Enterprise Architect – Code generation in use

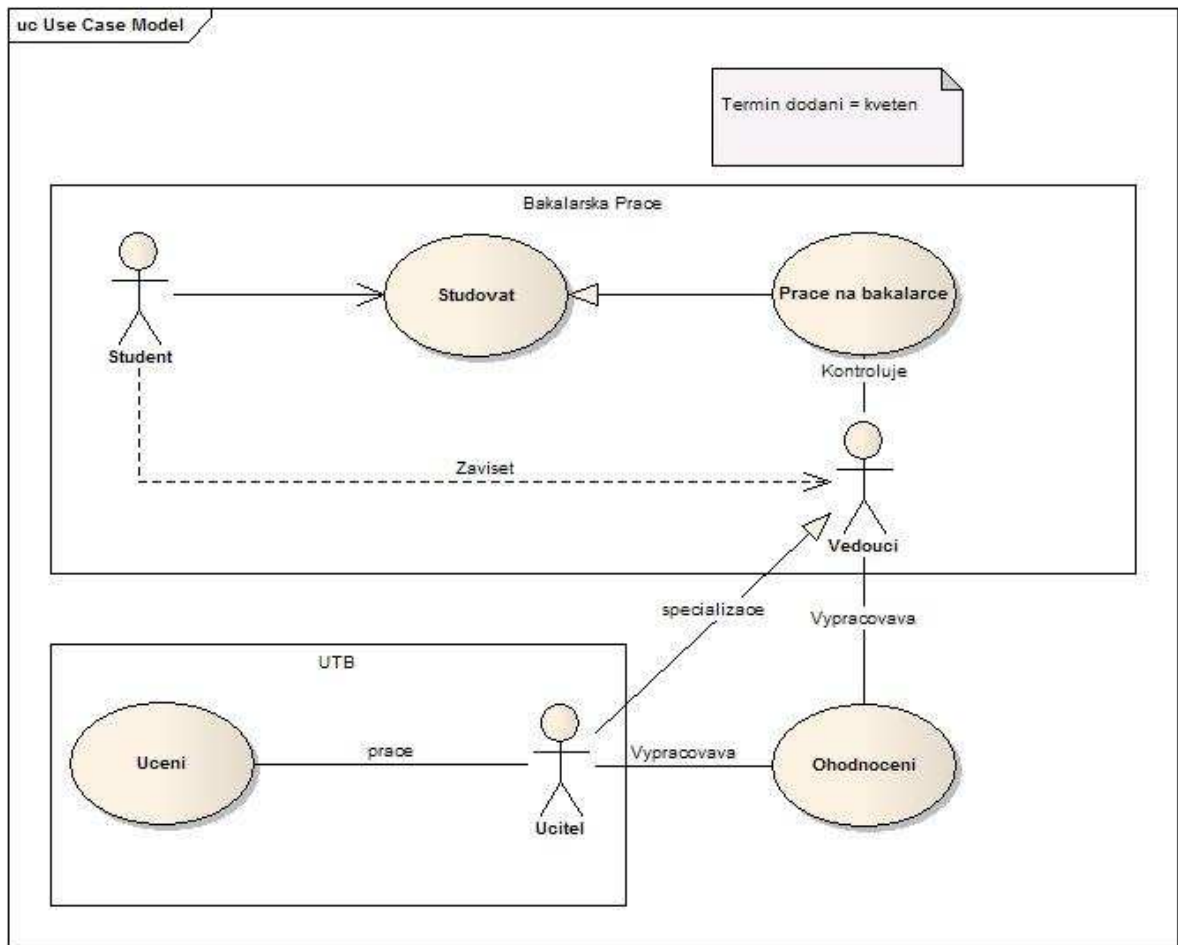


Figure 7: Enterprise Architect – Test Use Case (exported)

## 4 MICROSOFT OFFICE VISIO

Microsoft Office Visio was created by Microsoft. It is quite popular tool and offers wide possibilities and functions.

There are two editions:

- Microsoft Visio Standard – contains basic functions, however with less number of templates and features. You can create many kinds of diagrams (business process diagram, project management diagram, network diagram, block diagram and many more) but the support and smart features are disabled.
- Microsoft Visio Professional – added connectivity support, visualization features and many kinds of templates, motives and extended diagrams for specified business, IT, electronic and industrial sectors (e.g. scheme, architectural or system diagrams).

Tested version: Microsoft Visio Professional

Web page: <http://office.microsoft.com/cs-cz/visio/default.aspx>

### 4.1 General strengths

- High popularity – diagrams from Visio are commonly known, easy to share projects
- Nice-looking and intelligent User Interface (see chapter 4.3)
- Actualization of data – actualizes data in predefined time intervals. It is very convenient to use this when working with changeable models (databases for example)
- Possibility to connect Visio with other Microsoft products - Microsoft Office SharePoint Server 2007, Microsoft Office Project 2007 and Microsoft Office Excel 2007. Thanks to this, the import of appropriate data is very easy and fast. I was not able to test this feature because of unavailability of mentioned programs (except Microsoft Office Excel where import was very easy).

- Possibility to integrate Visio into other Microsoft products (Microsoft Exchange Server, Microsoft SQL Server, Microsoft Access 2007, Microsoft Visual Studio .NET, Microsoft BizTalk Server and Microsoft Windows Server). I was not able to test this feature because of unavailability of mentioned programs.
- Availability of many new templates which improve work with Visio (ITIL, Contingent diagram template and more standard templates for instance network diagrams or planner templates). These templates may be used during specialized analysis.
- Strong online support (see chapter 4.5)
- Check for updates from menu – user is warned whenever new update is launched so no browsing on Internet is necessary.
- Multi-lingual dictionary – this dictionary integrated in Visio allows user to translate whole documents but also word and phrases. Useful when creating diagrams in different language or when creating whole documentation of the project.
- Very strong security options – advanced knowledge of IT recommended (see chapter 4.6).
- Supports UML 2.1 – the newest version of this standard includes some new diagrams and entities, which are already included in Visio too.

## 4.2 General disadvantages

- Sometimes too complicated – many kinds of diagrams may cause disorientation for not-experienced user. Also the Visio's setting requires wide knowledge of IT (security, code generation, integration with other Microsoft applications).
- To work properly in Visio's sophisticated user interface is also long-term task. Even after month of work with Visio I have found feature that ease work with diagrams or tools so the variety and quantity of opportunities may be too much for some beginners.

- Also I miss some basic possibilities like moving with titles of relations or any texts on diagram (Visio is so strict that user has almost no opportunities to change diagram on its own). Sometimes when diagram is quite large the opportunity with moving the text is appreciated.
- There is no syntax control feature for UML diagrams so it is possible to generalize Use case with database table or include state machine object into class. For non-experienced users is possible to create UML diagrams which are not consistent with UML standard.
- Visio has wide domain across professions in IT. It is aimed to satisfy needs of IT professionals (e.g. analysts, programmers, testers, project managers) but also of architects, electrician experts and engineers. Many users may never use all capabilities of Visio (opportunities enlisted higher are only in Professional Edition of Visio 2007) and may therefore order much cheaper product elsewhere with almost same functionality.
- Visio doesn't support BPMN – for business analysis sometimes very important notation.
- Also some important templates for IT professionals are missing – testing template, project management template or user interface template.
- Price

### 4.3 User Interface

- Feature of searching of last used templates in document – saves a lot of time when user may quickly inter-change among templates.
- For hierarchical visualization of business data is prepared Contingent diagram template – shows the data in structured and well-arranged manner.
- Motives – this feature provides to user possibility to change whole diagram's colour and appearance. You can choose from the list of predefined motives but also to create a new one. User may use these motives to change diagrams in accordance



with its PowerPoint presentation (this is unique aspect of Visio, user have very wide opportunities to change the appearance of Visio's diagrams)

- Wide variety of templates and also possibility to create new one is appreciated when modelling large diagrams – user can create unique template which includes all necessary items.
- Test – Use Case diagram created within 10 minutes.

#### **4.4 User Administration**

Visio is very flexible CASE tool. Via programming or integration it is possible to change Visio in accordance with company's requirements. It is also possible to create whole new icons, objects and also diagrams. This feature is mostly supported through MSDN web (<http://www.msdn.com>) and also trough other Visio's providers.

#### **4.5 Documentation**

There is wide range of supportive documentation:

- Tutorials – for “where to start” option, nice when you are starting with Visio.
- Examples of projects – these projects are created to show possibilities of Visio and to be as a helping tool for tutorials.
- The main help has new approach – similar to html page with references. Nice intuitive design (see Feature 11).
- Rich online support – discussions, forum, FAQ, online courses and online flash animation.

#### **4.6 Security**

- Centre of Security – this tool provides well arranged interface which enables sharing of diagrams and models through Windows Internet Explorer or Microsoft

Office Outlook 2007. It is pleasant to have all setting and functionality in one tool, so work

- Locking diagram feature same as in EA.
- Possibility to set Visio's Centre of security to check for macros that might contain viruses or check links to files from suspicious Web sites. This appreciates users who add special text from MS Excel or MS Word into model or documentation. Most of users may not use this.
- Offers wide setting of privileges and users – user may be distinguished to groups, group may have different privileges, above it all is administrator. This feature is greatly appreciated for save team-work.

#### **4.7 Author's opinion**

Microsoft Office Visio 2007 is very powerful CASE tool that offers wide opportunities for many experts and professionals over the world. It covers all needs of Business Analyst through its sophisticated and fast user interface. It supports the newest technologies and offers wide online support and strong security.

However I miss some practical features (diagram syntax control, BPMN support) or possibilities primarily in User Interface. Work could be much easier if Visio would let more decisions on users.

The second disadvantage is complexity and price which is for example several times higher than price of Enterprise Architect.

### 4.8 Screens

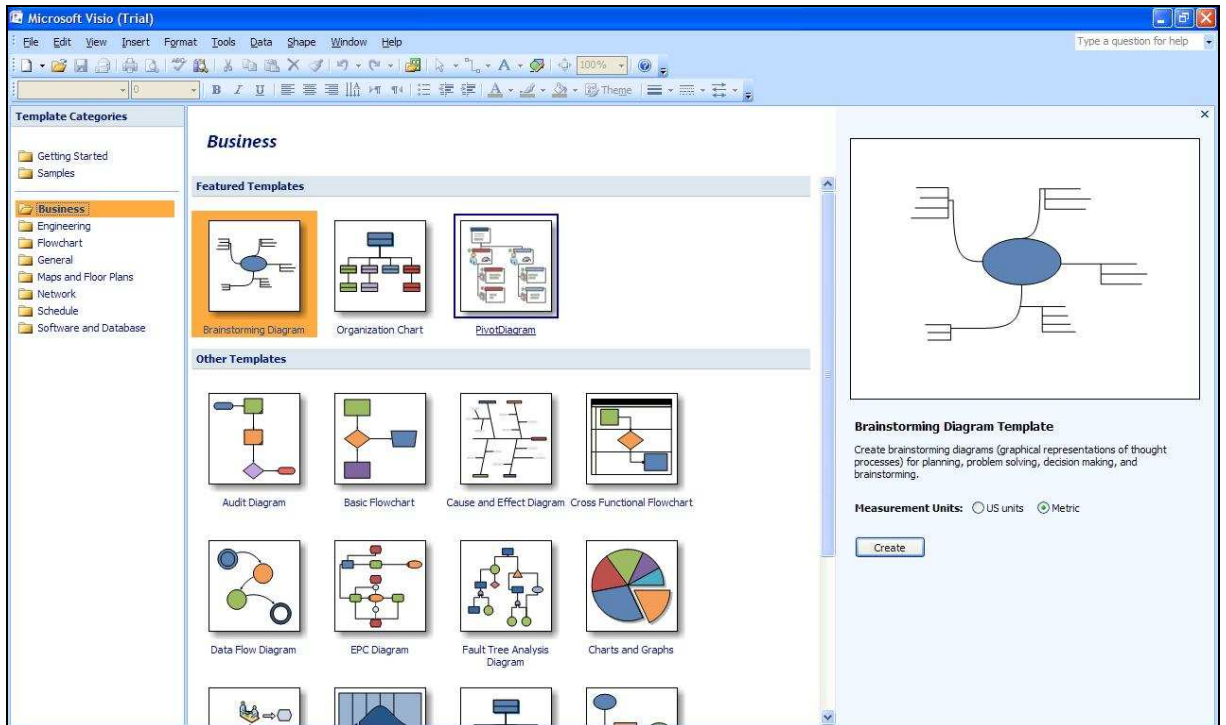


Figure 8: Microsoft Office Visio – New project creation

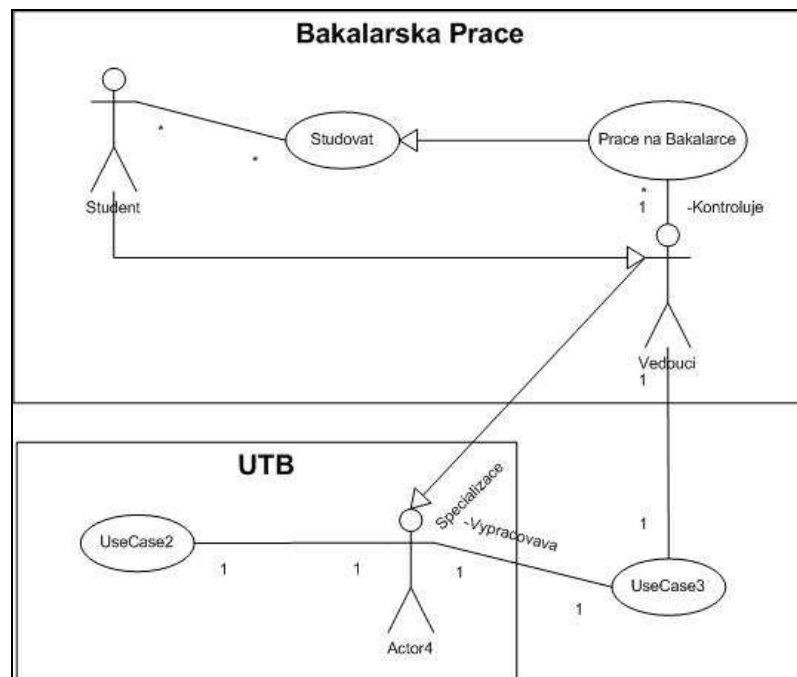


Figure 9: Microsoft Office Visio – Test Use Case (exported)

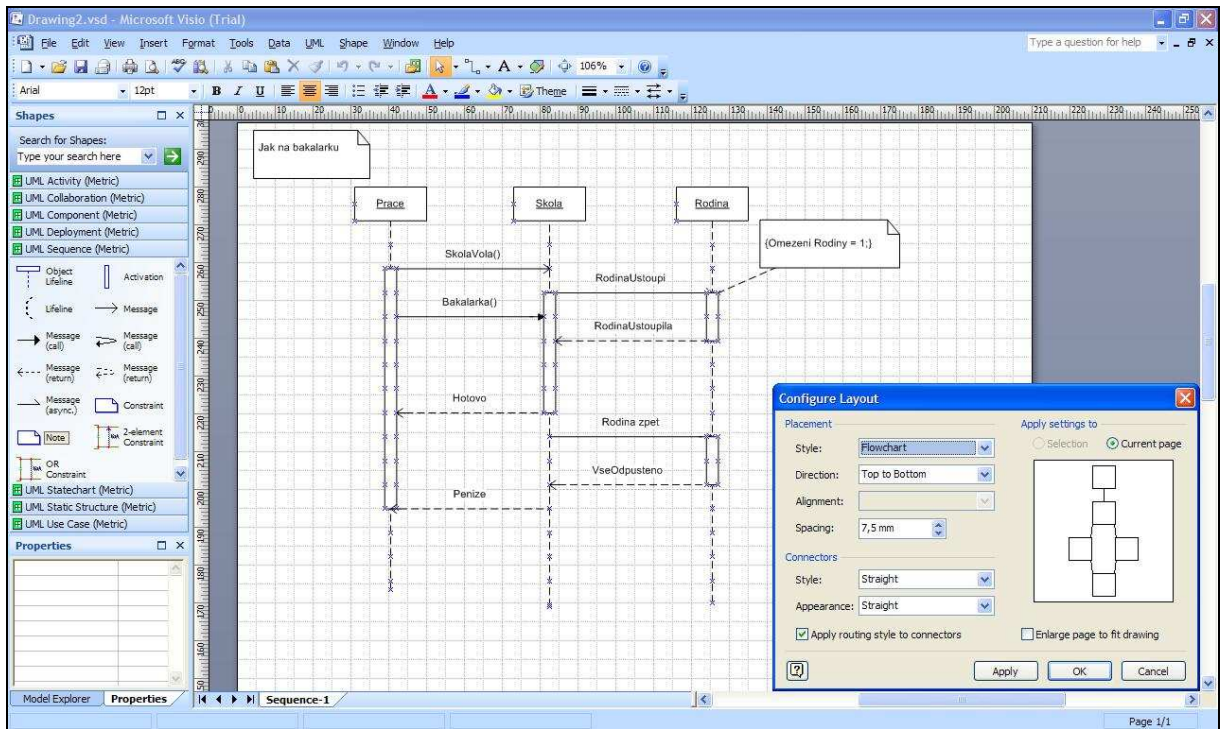


Figure 10: Microsoft Office Visio – sequence diagram with Layout Configuration

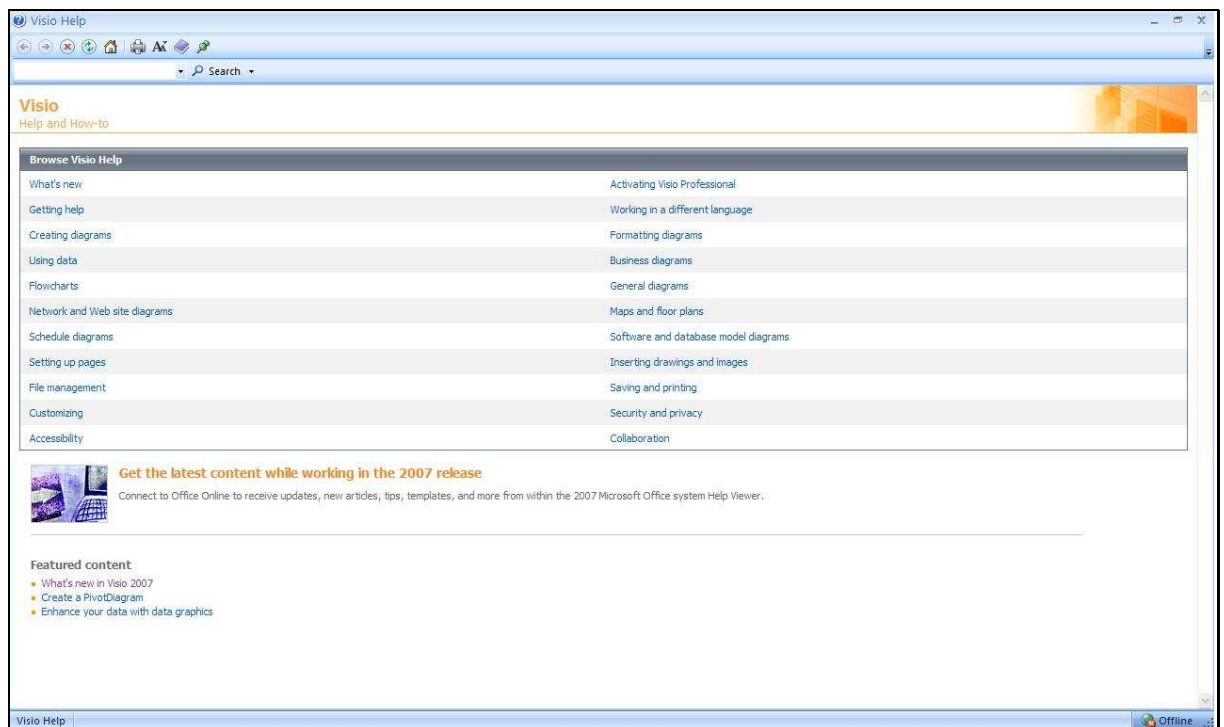


Figure 11: Microsoft Office Visio – Main help page

## 5 UMODEL

UModel is a product of Altova<sup>®</sup> and is basically oriented on creation of UML diagrams and generation of source code from Java, C# and other software languages.

Altova<sup>®</sup> is customer-focused company which is also responsible for creating XMLSpy (very popular XML development environment), it supports very wide range of software tools and business needs and has over 3 million customers all around the world. It is also active member of Object Management Group which is responsible for creating UML.

There are two editions possible: UModel Enterprise Edition and UModel Professional Edition

I was not able to find out the differences between these editions on their web site or anywhere else.

Tested version: UModel 2008 Enterprise Edition

Web page: [http://www.altova.com/products/umodel/uml\\_tool.html](http://www.altova.com/products/umodel/uml_tool.html)

### 5.1 General strengths

- Supports templates and generics (however generics only for Java, C# and Visual Basic). This feature is very useful when creating analysis documentation during development. Source files containing mostly hundreds of classes may be automatically generated into diagram and than just updated by analyst into well-arranged expression (continuity is maintained).
- Smart searching engine – e.g. searching of elements, words, phrases. Effective when modeling diagrams consisting of many correlated elements.
- Tracking system – never-ending undo and redo operations.
- Possibility to use command line interface – you can create for instance file consisting of many commands and than import it as a source code. Usually working like this is not necessary, but if you also work in operating system which is not

compatible with UModel (e.g. Unix, Solaris), you may use this as a time-saving opportunity.

- Supports UML 2.1 – the newest version of this standard includes some new diagrams and entities, which are already included in UModel too.

## 5.2 General disadvantages

- UModel is 32-bit application only for Windows operating system – see in chapter 5.1 Possibility to use command line.
- No multi-lingual support – UModel is not supporting other languages during installation (Spanish, German, and Russian).
- No support of project management or testing – for details see chapter 3.1 – Enterprise Architect.
- No possibility to work with databases on a model or functional basis – basically the support for database modeling is very small, no templates, no tools (for details see chapter 6.1 Visual Case)
- User Interface – sometimes slows work with unnecessary options, graphically underdeveloped.
- Not suitable for large work in teams – hard coordination, sharing and loading of diagrams and models.
- No privilege system or multi-user system
- No appropriate online support – UModel is not main product of Altova, so discussions can be hardly found.
- Absence of tutorial – no tool or feature which could support starting users with UModel.
- Weak support of even UML 2.0 standard – no system boundary, no timing diagrams, no pins in State machine diagrams and more.

### 5.3 User Interface

- Possibility of integration into Eclipse or Visual Studio .NET – this feature is primarily for developers. I was not able to test this feature because I do not have Eclipse or Visual Studio.
- Possibility to modify toolbars, elements and diagrams – user may change the order in toolbars or menus, or create new tab where are all most-used features he use.
- Easy and fast traceability of changes in every model
- Addition of hyperlinks is surprisingly easy – this feature is able to find in the highest menu, so there is no need to click on specific settings. Usually are hyperlinks used when generating documentation or mostly from class models where it is necessary to reference on some Internet page.

### 5.4 User Administration

The administration is quite simple – there are no detailed settings for privileges, multi-user, sharing of documentation or other.

### 5.5 Documentation

- Help containing descriptions of features and possibilities – standard.
- Online help contains the same help in the UModel product and support (Installation, bug report and other) plus FAQ. See [11].
- Support centre containing help and information about installation, product functionality and feature report is also able to find on Altova's web page [11].

### 5.6 Security

There is no security in UModel:

- No privilege system
- No administrator user

## **5.7 Author's opinion**

UModel is designed for individual analysts or developers. The functionality is basic, but is enough to model all UML diagrams and to generate with the most popular languages. However, use UModel in team work with other analysts is almost impossible and makes a lot of complications – security and privileges absence.

Its advantage is simplicity so for beginners and not very demanding Analysts is suitable.



### 5.8 Screens

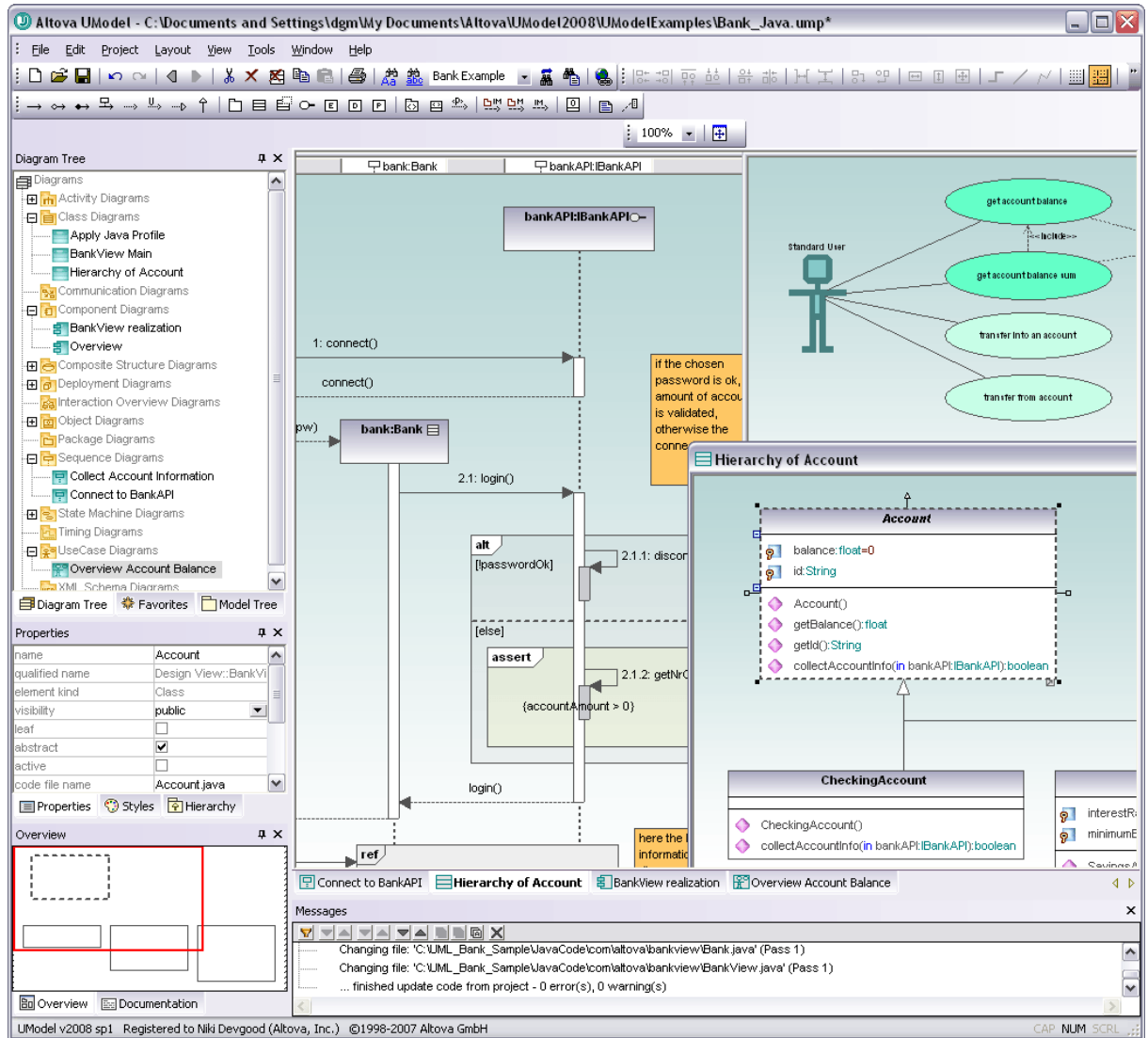


Figure 12: UModel – Sequential, Use Case and Class diagrams [12]

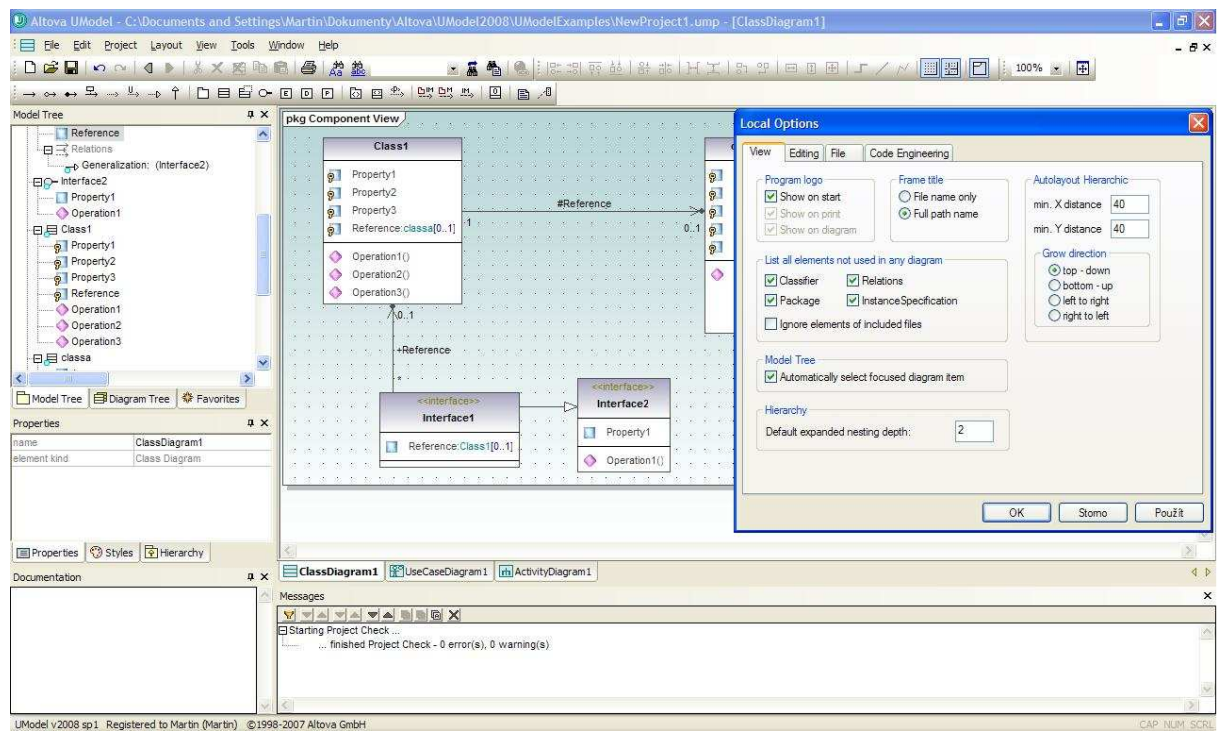


Figure 13: UModel settings and Class diagram

## 6 VISUAL CASE

Visual Case is a product of Artiso Corporation since 2002. Visual Case is more oriented in database modeling than in business analysis. Because of this specialization it is still quite popular CASE tool even in very competitive IT market.

Artiso Corp. launched just one edition of Visual Case.

Tested version: Visual Case 2.13.0

Web page: [www.visualcase.com](http://www.visualcase.com)

### 6.1 General strengths

- Very wide support of databases (MS SQL Server, Oracle, Sybase, MySQL, MS Access, InterBase, Pervasive, PostgreSQL, SQLite). This support enables Visual Case to be used in wide range of projects.
- Possibility to create Database diagram by reverse-engineering – most of CASE tools support reverse-engineering with Class diagrams and support programming languages (Java, C etc.). This feature may create Database diagram from SQL or PL/SQL.
- SQL Editor – sophisticated tool to create and manage SQL queries (keyword prompting, formatting, SQL queries inserting directly from SQL dictionary).
- SQL Pad tool – possibility to run SQL queries directly from Visual Case to physical database (supports both ODBC and JDBC technologies).
- Dynamic Viewer feature – possibility to overview complex diagrams with ease and orientation. Useful after reverse-engineering, because the diagram is generated by computer program and sometimes it is very disorganized.
- Good price

## 6.2 General disadvantages

- User Interface (see chapter 6.3)
- No complete support of all UML 2.1 diagrams (e.g. timing, composite, object diagrams)
- No support for other parts of software development process except databases (project management, development, testing).
- No possibility to integrate Visual Case with any IDE or other applications from Artiso Corporation.
- No possibility to generate a diagram from source code of any computer language.
- Low online support, not so popular in IT sphere.
- Export of diagrams into JPEG files is completely useless – diagrams are very small and no setting is offered to set this.
- Bugs – when adding Constraint in Use Case diagram, the diagram freeze and no other items can be moved.

## 6.3 User Interface

- User interface is not so graphically developed as its other competitors (Icons, models and even relations could be prettier).
- Many features which could ease the modeling in Visual Case are missing (icons for new objects, templates with last-chosen items, relationships connecting option and more)
- Spell checker – good when creating diagrams in different language
- Test – Use Case diagram created within 9 minutes.

## 6.4 User Administration

- It is possible to set colors and styles of diagrams – user may change the order in toolbars or menus, or create new tab where are all most-used features he use.
- Possibility to set Diagram Viewer properties and basic spell checker rules

## 6.5 Documentation

- Main help in Visual Case is very simple, sometimes little bit short and after choosing any single topic, another window shows-up. This un-continuity is very unpleasant because of changing windows over and over.
- No tutorials, no examples of projects, just feature, which advice tips from main help
- No supportive documentation on web site – neither forum nor presentation, just few self-propagation text articles.

## 6.6 Security

There is no security in Visual Case.

## 6.7 Author's opinion

Visual Case is quite worse than its previous competitors both in graphical appearance and functionalities. Its primary advantage is rich database support with many supportive tools which makes Visual Case the best choice when working on a project with databases and Business Analysis is not too complicated.

### 6.8 Screens

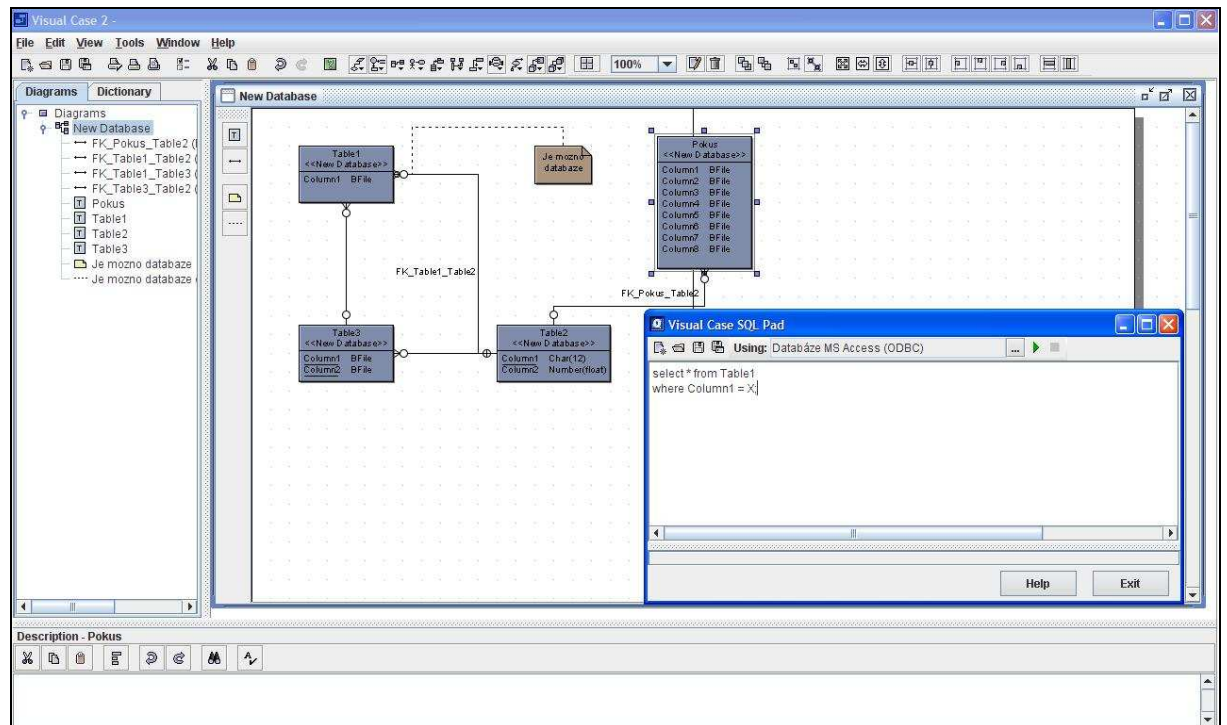


Figure 14: Visual Case – MySQL database model with SQL Pad tool

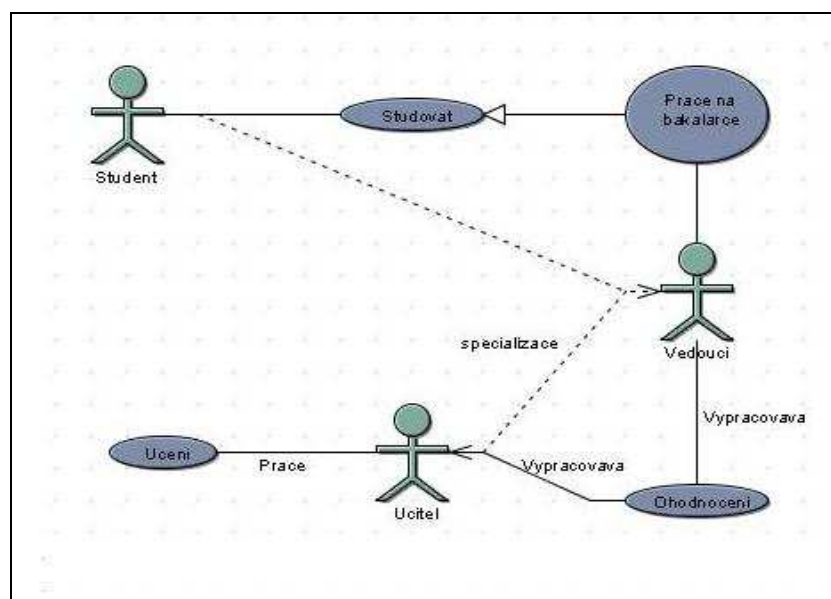


Figure 15: Visual Case – Test Use Case diagram (not exported)

## 7 VISIBLE ANALYST

Next candidate is Visible Analyst, the product of Visible Systems founded in 1984. Visible Analyst is the first product and the first release was launched in 1984 which makes Visible Analyst the oldest CASE tool in this thesis.

Attitude of Visible Systems is quite different from other companies creating CASE tools. For example the trial version of Visible Analyst can not be directly downloaded from web page. Potential customer has to write an email to Visible Systems with request to try one of their products.

Second difference is that trial version is just for four days. I have not encountered full version so I had to communicate with Visible Systems and thoroughly tested latest version of Visible Analyst for whole four days.

Visible Analyst may be purchased in three different editions:

- Standard Edition – includes traditional structures required for business analysis (UML diagrams, design, data modeling)
- Corporate Edition – includes extended number of model types, interfaces. Possibility of business planning.
- Enterprise Framework Edition – represents maximum functionality of Visible Analyst (inc. VA repository and framework-based interface)

Tested version: Visible Analyst 7.6 (32-bit) Enterprise Framework Edition

Web page: [www.visible.com](http://www.visible.com)

### 7.1 General strengths

- Supports multi-user access with privilege system – it is possible to create multi-user structure, where is administrator and users with privileges. This feature creates save and organized environment in team-based projects.

- Supports wide range of databases - Centura's SQLBase, SQLServer 6.5, SQLServer System 10, DB2 5, Informix, Oracle Server and 30 more kinds of databases.
- Supports of generation and reverse engineering of source code – this feature is very useful when creating analysis documentation during development. Source files containing mostly hundreds of classes may be automatically generated into diagram and than just updated by analyst into well-arranged expression (continuity is maintained).
- The Repository feature – Visible Analyst's database which is created automatically during the development of the project and contains project's information (management database, data definition, object, diagrams, entities, relations, backup of the project, etc.).
- Supports UML 2.1 – the newest version of this standard includes some new diagrams and entities, which are already included in VA too.

## 7.2 General disadvantages

- User Interface – work in Visible Analyst's UI is sometimes very fast, however for my opinion it contains lack of freedom for user. Renaming any component is quiet difficult (firstly delete sheet for specific item, than rewrite name and select the type of item again). Relations are not bendable and are not automatically directing to the entities' centre or corner.
- Almost no “undo” and no “redo” actions – these actions restore or continue in the changes of project user made. For proper work it is almost impossible not to use sometimes these actions. Undo action works only if changed item is still selected, afterwards is can not be used.

## 7.3 User Interface

- Nice-looking – a lot of icons, diagrams looks nice and well arranged even with many entities
- Diagrams are not visible on main page, so the jumping among diagrams is tedious.



- Sometimes the program evoked unexpected error and was terminated by Windows – usually when moving System Boundary containing some entities in Use Case diagram
- Syntax control system – controls the syntax of diagrams on UML level
- Test – Use Case diagram created within 11 minutes.

#### **7.4 User Administration**

- There is possibility to define user attributes which represents user's sign on each diagram.
- The possibility to change color and slight design of diagrams is standard also in VA.

#### **7.5 Documentation**

- Main help is simple and covers just Visible Analyst's features and possibilities. No tutorials, no interactive guides.

#### **7.6 Security**

- Permission system for multi-users
- No control access of project files at the DOS level

#### **7.7 Author's opinion**

Simple in all aspects – no sophisticated setting, easy and intuitive User Interface, just basic functionalities which makes VA convenient CASE tool for beginners.

However, during the testing of trial version I found serious bugs which mean that VA has to be still properly developed. Also absence of redo and minimal undo functions is quiet inconvenient for proper work with this tool.

The delivery of this product is quiet complicated – it is not possible to order product directly from page. The only way is to call or write e-mail to Visible Systems’ support and order it, which is not standard.

### 7.8 Screens

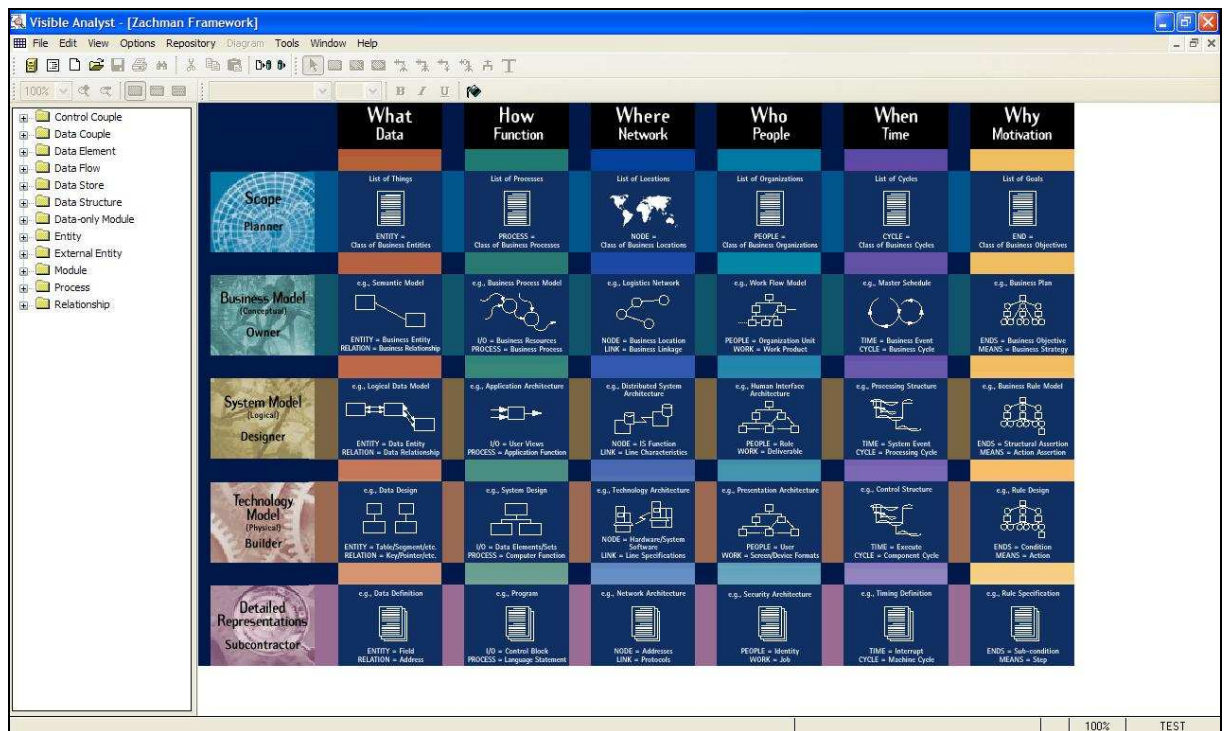


Figure 16: Visible Analyst – Main page

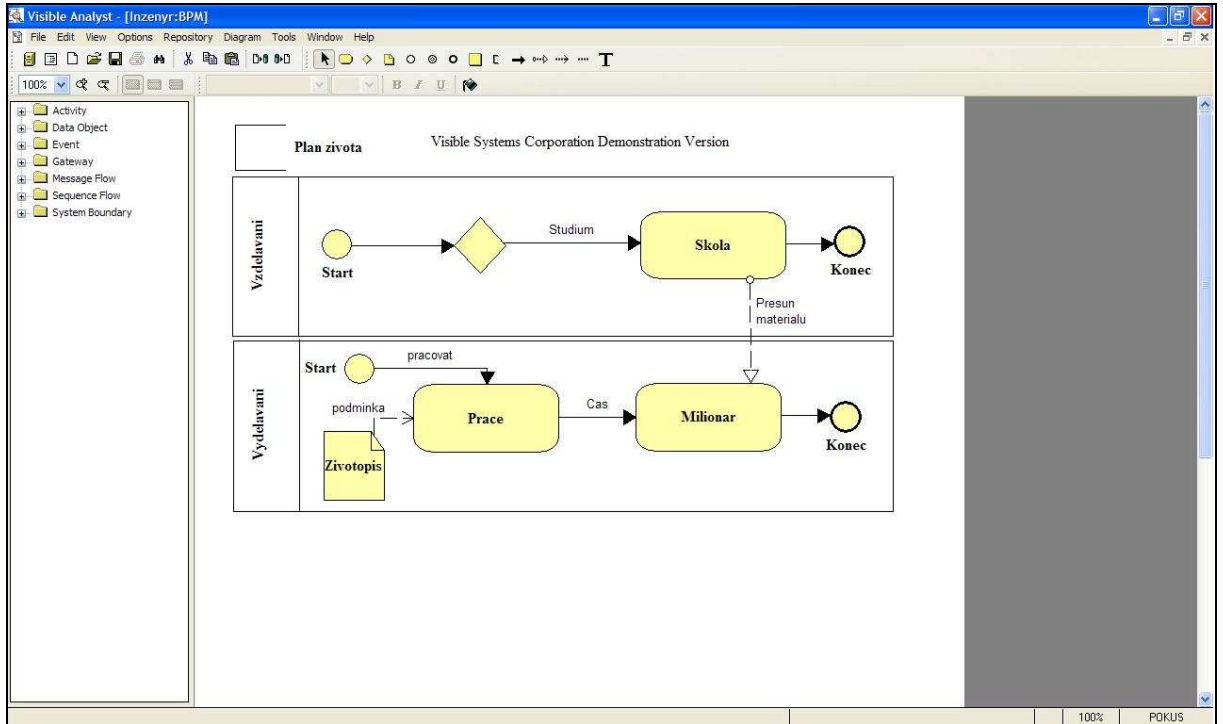


Figure 17: Visible Analyst – business process (BPMN)

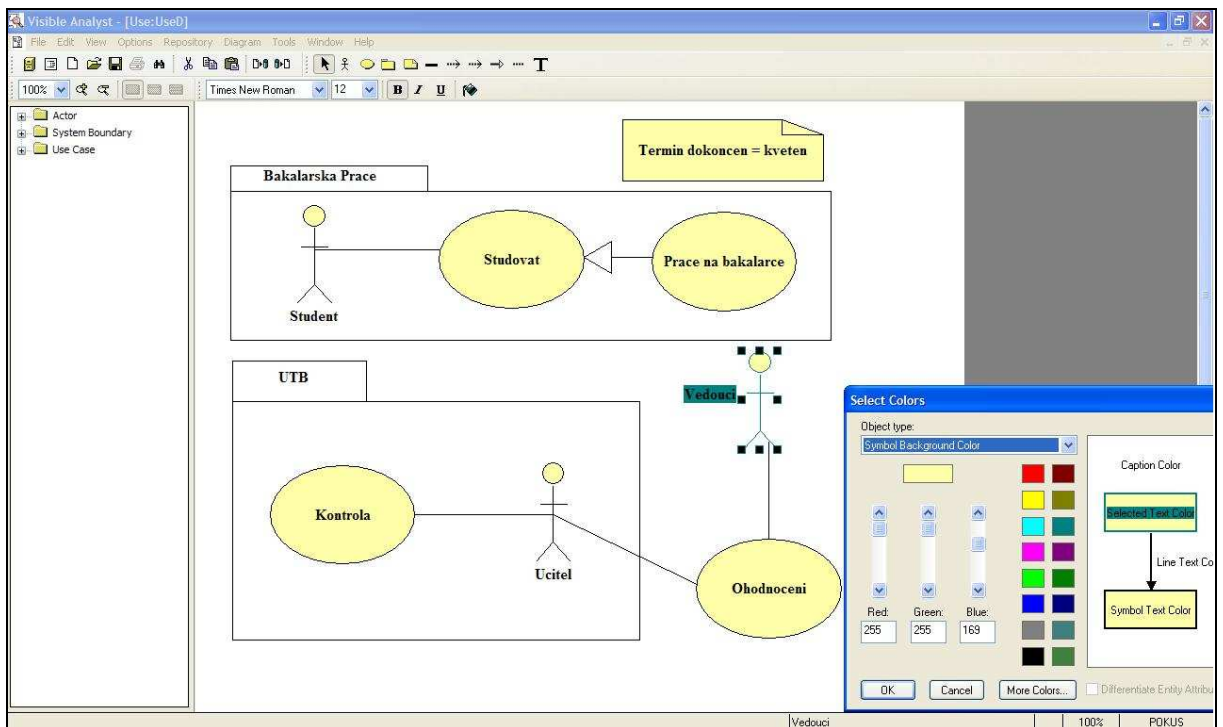


Figure 18: Visible Analyst – Test Use Case diagram (not exported)

## 8 VISUAL PARADIGM FOR UML

Visual Paradigm is provided by Visual Paradigm International. Its products are highly developed and supported. In all, over 70% of the Fortune 500 depends on VP International's products and services to keep them competitive [14].

It is possible to buy Visual Paradigm Suite consisting of following parts:

- Visual Paradigm for UML – object of testing, modeling CASE tool.
- Smart Development Environment – possibility to embed VP-UML to number of most popular IDE tools (Eclipse, IntelliJ IDEA, WebLogic, JBuilder and more). This integration appreciate primarily developers, who use most of the time IDE tools.
- DB Visual ARCHITECT – environment which is specialized for UML Class diagram and ER diagram modeling. Useful for system architects and consultants (possibly project managers)
- Business Process Visual ARCHITECT – this tool allow user to create models in accordance with BPMN standard. This tool may use analysts and project managers for process specification.
- Agilian – this environment is specially designed for Agile Modeling.
- DB Visual ARCHITECT SQL – this environment supports database modeling, useful in Data Warehouse projects.

Visible Analyst may be purchased in six different editions:

- Enterprise Edition – this edition supports all features and functionalities of VP-UML. Specially supports BPMN, Mind diagrams and UI designer in compare with Professional Edition.
- Professional Edition – supports wide database functions (reverse-engineering, database drivers, Object rational modeling and more), IDE integrations and Java round-trip engineering in compare with Standard Edition.

- Standard Edition – supports subversion and CVS repository functions (even team collaboration with these technologies), reverse engineering and code generation in compare with Modeler Edition.
- Modeler Edition – supports Shape editor (designing of shapes of entities), documentation generation and VP Teamwork Server team-collaboration features in compare with Personal Edition.
- Personal Edition – supports layout facilities (automatic diagram layouts) and some export features in compare with Community Edition.
- Community Edition – supports whole UML support (all diagrams), require management, ER diagrams, Visual modeling (features to create diagrams in UI), style and formatting.

To see more about differences among editions see [14].

Tested version: Visual Paradigm Suite 3.2 – Enterprise Edition

Web page: [www.visual-paradigm.com](http://www.visual-paradigm.com)

## 8.1 General strengths

- VP Suite represents complete pack of tools and environments which may cover all needs of all professionals on project. For a company it is far better to buy one fully mutually integrated tool than five or more tools for which integration and sharing could imply risks.
- Excellent User Interface (see chapter 8.3)
- High support of database and database modeling (reverse-engineering, SQL generation and creation) – mainly supports developers and project's aimed on database creation or update.
- Multi-lingual tool – supports several most used world's languages (however, Czech is not among them)

- Supports of generation and reverse engineering of source code in many languages (C++, Java, PHP, PYTHON, COBRA, .NET, Ada 9x, XML). This feature is very useful when creating analysis documentation during development. Source files containing mostly hundreds of classes may be automatically generated into diagram and than just updated by analyst into well-arranged expression (continuity is maintained).
- Spell checker – useful when creating diagrams or documentary in different language.
- Supports UML 2.1 – the newest version of this standard includes some new diagrams and entities, which are already included in UModel too.

## 8.2 General disadvantages

- It is possible to read self-promotion [14] that VP-UML is very fast, but I have not noticed maybe opposite speed difference in compare with other products.
- Quiet weak security for a tool which is mainly aimed for corporations covering whole project's needs.
- Price

## 8.3 User Interface

- Brilliant modeling characteristics – many features (auto aligning of entities, clever system of relation-connecting, well arranged icons and graph grid which allow user to model correct and straight diagrams) makes modeling very easy and fast.
- Very clever solution of modeling diagrams in diagrams – user may choose and define the shape of new diagram in already created diagram, than just edit second diagram and make relations in first diagram. User may have many diagrams of different shape (rectangle, square or polygon) and still maintain well-arranged manner of main diagram.

- Many supportive tools in UI – for instance Gesture pen thank to user may paint lines and shapes via mouse instead of pen (useful during presentation) or Sweeper which enables user to move part of diagram to create more free space for modeling.
- No need to mention flexible opportunities to modify entities, colors, shapes and appearance of whole diagrams, unlimited undo and redo operations, highly sophisticated grouping and a lot more (see [14]).
- Test – Use Case diagram created within 6 minutes.

#### **8.4 User Administration**

- It is possible to set colors and styles of diagrams – user may change the order in toolbars or menus, or create new tab where are all most-used features he use.
- It is possible to set characteristics of many supportive tools (Sweeper, Case Scheduling, Stereotypes), however usually enquires sophisticated IT knowledge.

#### **8.5 Documentation**

- VP-UML supports document generation to many formats and also intelligent documentary creation during reporting.
- Quiet weak support for beginning users – no tutorial, help has to be downloaded from web first, no “click tips” showing single features or possibilities for user.

#### **8.6 Security**

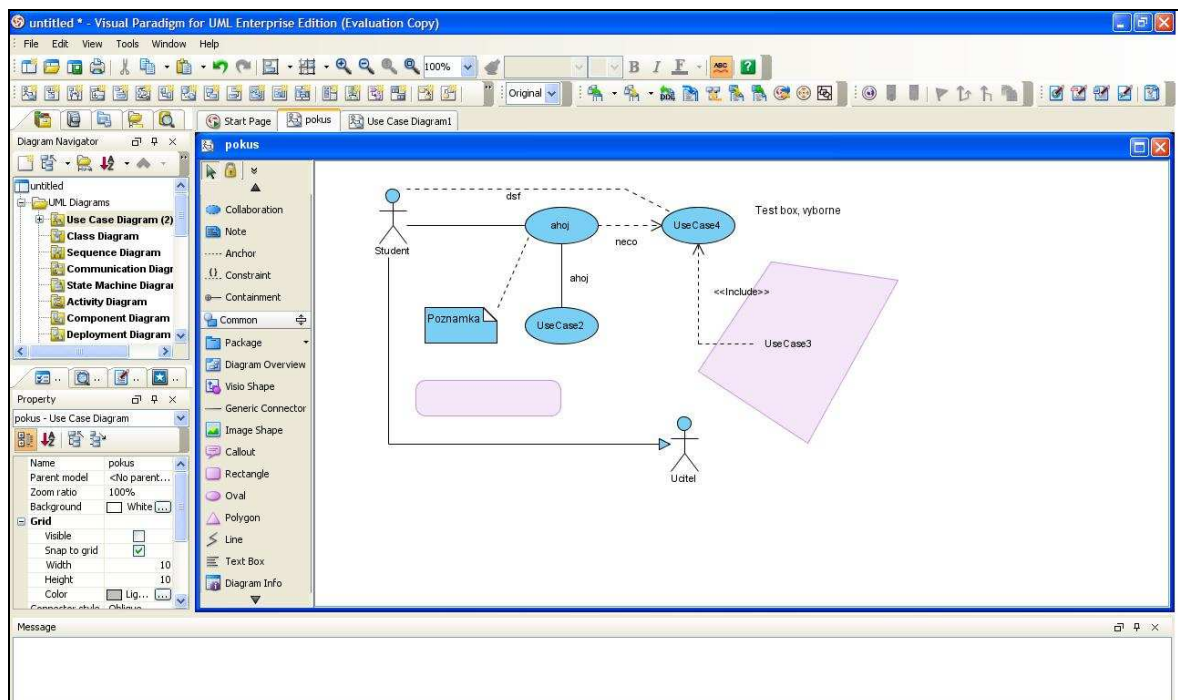
- Possibility of sharing and locking of diagram
- No privilege system, no administrator user

## 8.7 Author's opinion

Visual Paradigm for UML is very sophisticated award winning CASE tool. It supports very wide range of newest technologies together with one of the best User Interface I have ever experienced. Intuitive with many tools with look&feel approach, however on older notebooks may cause slowness thanks to graphic design and sophisticated features (nevertheless web self-promotion says).

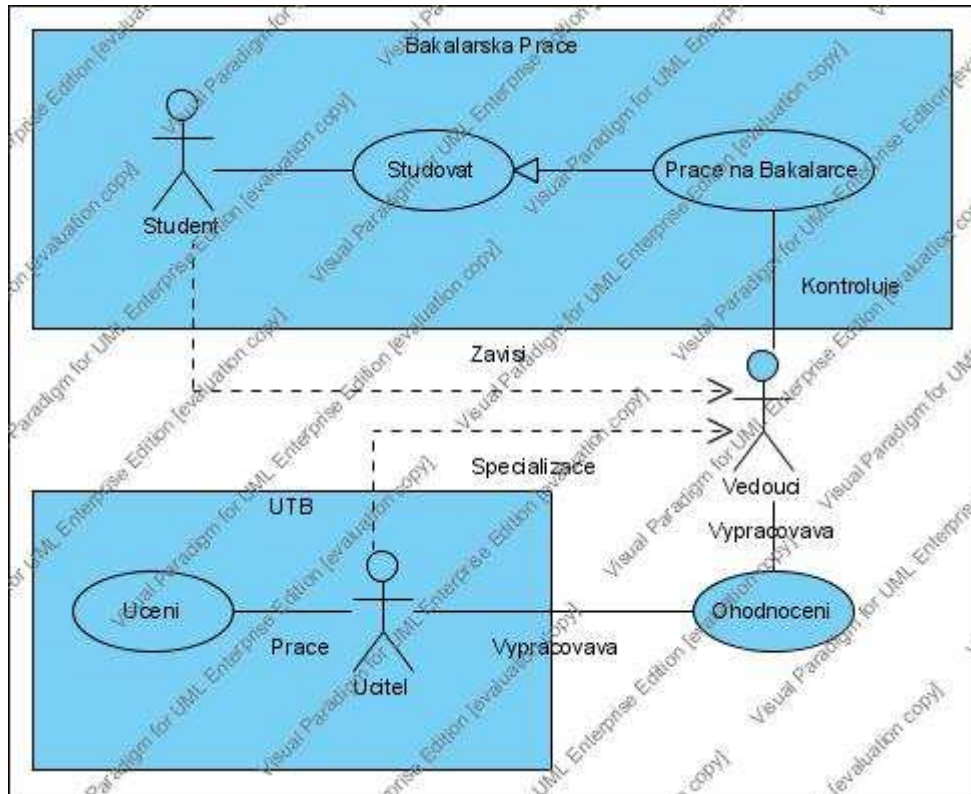
As great and fine VP-UML may look, I would not recommend it to every beginning analyst because of high price and un-necessity to use all of its wide opportunities. More likely I would recommend it to whole companies which do not have to buy many tools but just this Visual Paradigm Suite containing everything almost every project would request.

## 8.8 Screens



Screen 19: Visual Paradigm for UML – Use Case diagram with grouping





Screen 20: Visual Paradigm for UML – Test Use Case diagram (exported)

## 9 POSEIDON FOR UML

Last candidate is Poseidon for UML of GentleWare AG, which was founded quite lately in 2000 by Dr. Marco Boger. Its main product is plug-in into Eclipse called Apollo for Eclipse. Its second product is Poseidon for UML. GentleWare AG is a member of OMG (organization responsible for UML standard) and is a member of Eclipse Foundation [15].

Poseidon for UML may be purchased just in three different editions:

- Embedded Edition – this edition is aimed for client-server needs. It supports easy installation on server, collaboration modeling on client-server architecture, server-based handling.
- Professional Edition – offers maximum functionality for single or team-working analysts.
- Standard Edition – support Java reverse engineering, plug-in support however full round-trip engineering in Java with support of other languages is only in Professional Edition.
- Community Edition – supports UML 2.0 diagrams and basic functionality.

Tested version: Poseidon for UML 6.0 – Professional Edition

Web page: [www.gentleware.com](http://www.gentleware.com)

### 9.1 General strengths

- Very high and sophisticated support for developers – Java round-trip engineering, full support of code-generation (C#, C++, CORBA IDL, Delphi, Perl, PHP4, SQL DDL, and VB.net).
- Possibility to integrate Poseidon to Eclipse – useful just for developers.

- Possibility of generation documentation from UML diagrams – this is quiet standard, but here I think it should be taken as advantage.
- Multi-lingual tool – supports several most used world’s languages (however, Czech is not among them)

## 9.2 General disadvantages

- Extremely slow – even starting of setting takes ten seconds and more.
- Terrible User Interface – see chapter 9.3.
- Supports just elementary UML 2.0 diagrams and features – some may not be in accordance with the latest UML 2.1 (timing diagram, some entities in class diagram and a lot more, see [7]).
- Whole application is running on Java – may cause problems on computers with older JDK (Java support) version. For instance I had problems to uninstall Poseidon thanks to my older version, however Poseidon never warned me about this complication.
- Export of Test Use Case diagram caused bug, which did not display use cases in the final exported picture.
- Price – several times higher than EA’s price.

## 9.3 User Interface

- It is almost impossible to select any item in diagram – when double-clicking on Actor or other Entity, the whole diagram is selected instead of showing properties of required entity. To see properties it is necessary to be very careful and try triple-clicking.
- There are many “improvements” which makes work harder than it would be instead of these features – icons of relations near the entity always disappear when user tries to select them, so it is almost impossible to use them. To set multiplicity requires master-clicking when trying to select little point near relationship.

- The properties table is not in separate window – it disappears when user click elsewhere.
- No supportive tools to help with editing or creating of diagrams – no searching of entities, very limited redo action possibilities, no syntax control.
- Graphically very unattractive and no color or shape change possibility.
- Test – Use Case diagram created within 11 minutes.

#### **9.4 User Administration**

- User may change layout and display of diagram just checking of some pre-set choices
- Basic setting same for every CASE tool in this work

#### **9.5 Documentation**

- Help is just in html – no searching, very chaotic with almost no illustrations.
- Tutorials, FAQ and discussions on web site [15]. Good for beginners.
- Nice flash animation on web site

#### **9.6 Security**

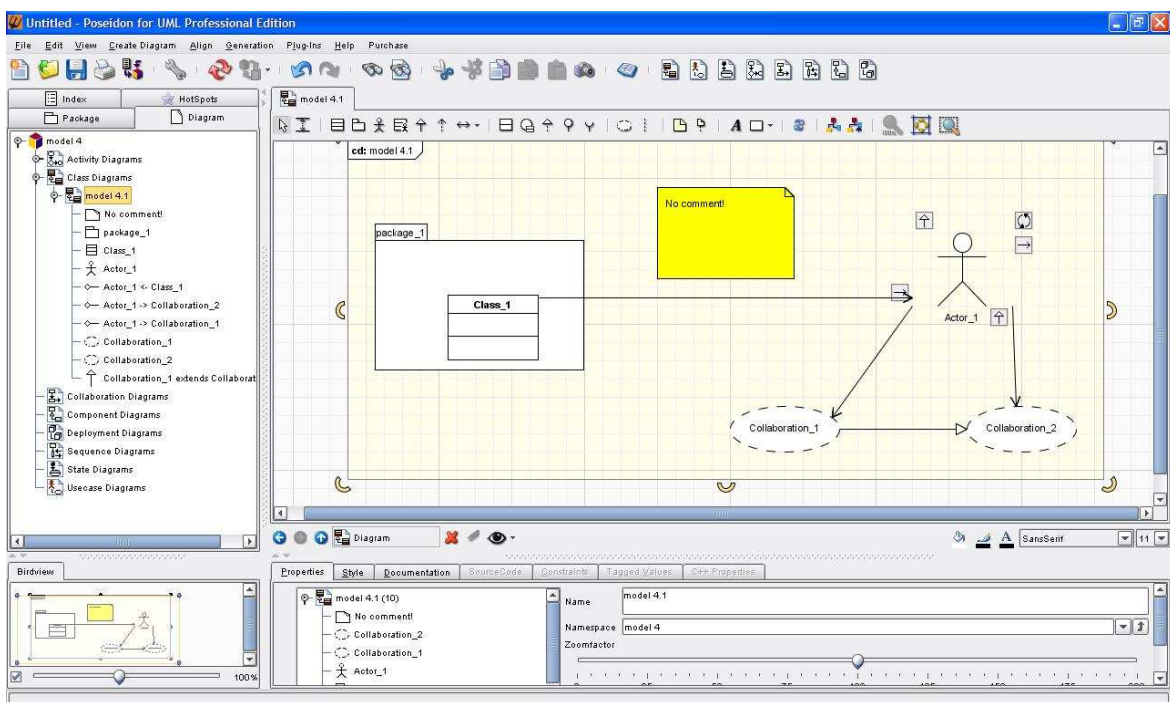
- There is no security in Professional Edition, however in Embedded version may be (I have not tested it)

## 9.7 Author's opinion

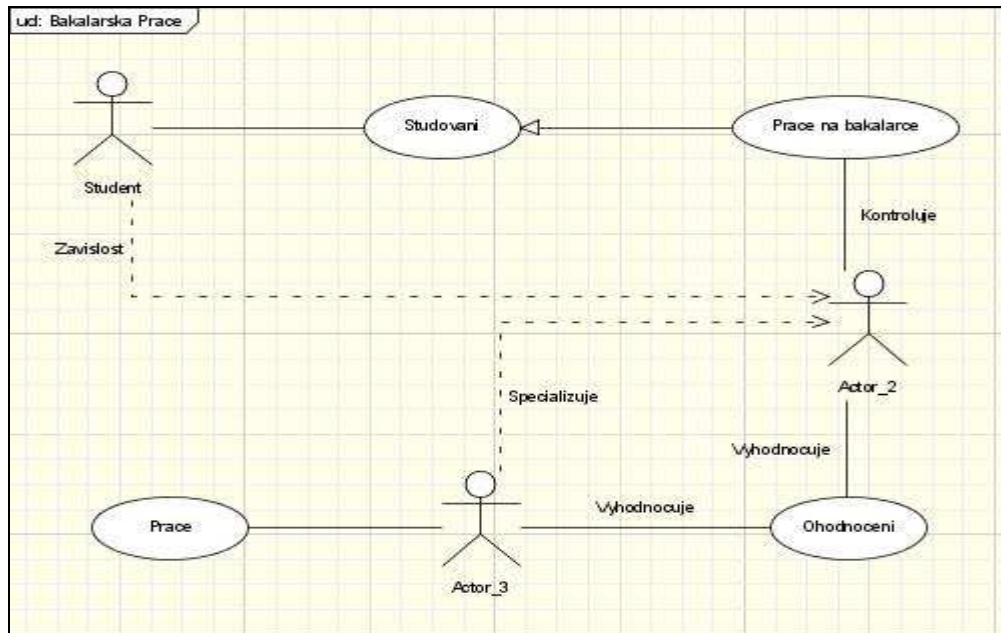
Well, Poseidon for UML is maybe the worst candidate of all in this work for Business analysts, however for developers who are oriented also in basic analysis may be useful. It combines most of developer's needs with basic analysis opportunities.

What is worse, the unattractive and underdeveloped UI may be insufficient even for developers, who may use for instance Visual Paradigm Suite which contains also VP-UML and probably for the same price.

## 9.8 Screens



Screen 21: Poseidon for UML – Mix of Use Case diagram and Collaboration Diagram



Screen 22: Poseidon for UML – Test Use Case (not exported)

## ZÁVĚR

Dnes je již skoro nemožné si představit vývojový proces softwaru bez Business Analýzy. I když na menších projektech je od BA ještě upuštěno vzhledem k její vysoké ceně (také proto, že mnohdy vývojáři jsou schopni jistou základní analýzu provést sami), je to stále poměrně riskantní a může se tak stát, že se během vývoje či dodání softwaru může objevit závažná chyba, která může projekt prodražit či úplně zrušit. Business analýza je užitečná především na větších a rozsáhlejších projektech, kde enormně rozlehlé systémy je nemožné pochopit jako celek a je nutné pro správné řešení pochopit nejprve jeho části.

Vzhledem k velkému počtu CASE nástrojů, které umožňují vytváření diagramů a procesů pro BA (mezi další populární nástroje můžeme zařadit např. System Analyst, AnalystPro, Power Designer, RequisitePro nebo Visual Paradigm for UML) je poměrně komplikované vybrat jen omezené množství nástrojů k porovnání. Výběr jsem tedy zaměřil na nástroje, se kterými již mám zkušenost, aby porovnání mohlo být podloženo praktickými poznatky (působil jsem v BA po 3 roky na několika projektech – Telefonica O2, Sitronics, Vodafone, IBM).

Enterprise Architect je velmi kvalitní nástroj jehož hlavním směrem působení je business analýza (např. Visual Case je orientován primárně na modelování databázových modelů než na diagramy BA). Jeho široké spektrum možností a funkcionalit (testovací a plánovací nástroje) podporují jak práci v týmu tak práci jednotlivých analytiků. Nízká cena a výborný User Interface zároveň s vysokou popularitou vytváří mix vlastností, které může ocenit nejspíš každý business analytik. Nicméně bych ho raději doporučil zkušenějším uživatelům, kteří budou schopni plně využít jeho schopnosti a možnosti.

Microsoft Office Visio je další z propracovaných nástrojů od celosvětově proslulé firmy. Jeho výhodou je skutečně vynikající support jak online tak i v nástroji jako samotném (tutoriály, videa, presentace, možnosti integrace s ostatními aplikacemi

Microsoftu apod.). Visio má ještě širší spektrum možností než EA co se týče počtu diagramů. To je zároveň i omezení, jelikož spousta uživatelů zcela jistě nevyužije všechny možnosti, které Visio nabízí. Jeho cena mnohonásobně převyšující EA také může leckoho odradit. Pokud ne, bude moci vyvíjet velmi pěkné modely v propracovaném a chytrém prostředí.

UModel je již poněkud odlišný od předchozích dvou konkurentů. Nemá tak propracovaný User Interface, pro standardní potřeby však bohatě stačí. Jeho jednoduchost a dostupnost s výhodnou cenou může být pro nenáročného Business analytika zajímavá.

Visual Case je možná na první pohled poněkud specifický nástroj určený pro modelování databází, ale jako takový umožňuje i tvorbu všech diagramů UML. Díky této kombinaci je výbornou volbou na projektech, kde se jako hlavní pracuje na databázích a business analýza je jako doplňující faktor. V tomto ohledu předčí své ostatní konkurenty svými specifickými možnostmi.

Visible Analyst je poslední z řady CASE nástrojů v této práci. Nabízí standardní funkce a jednoduchý avšak rychlý UI. Bohužel jsem při testování narazil na několik chyb, které mi vzápětí celý program ukončily. Také jako jediný produkt je možné stáhnout pouze čtyř denní trial verzi (ostatní umožňují minimálně měsíc na vyzkoušení). Dle mého názoru jsou 4 dny s některými omezenými funkcionalitami navíc velmi málo. Proto si myslím, že je tento produkt ještě potřebuje jistý čas na to, aby byl správně otestován. Potom by mohl tento nástroj být silným konkurentem všech ostatních konkurentů uvedených v této práci.

Visual Paradigm for UML je velmi propracovaný nástroj. Je součástí Suite verze, která se skládá z několika rozdílných programů, které jsou schopny pokrýt všechny požadavky na projekt (od analýzy po požadavky na metodologii přes testování až po samotné dodání). Jeho skvělý UI velmi usnadňuje práci i při vysokých nárocích na vytváření diagramů. Díky širokému supportu a popularitě (také díky prestižním oceněním) je Visual Paradigm skvělou volbou pro zkušené analyticky. Pro začátečníky bych doporučoval spíše levnější produkty (EA nebo UModel).



Poseidon for UML je pravděpodobně jeden z nejhorších konkurentů této práce. Jeho velmi nepropracovaný UI spíše zpomaluje a znepříjemňuje práci. Nástroj je určen spíše pro programátory, kteří si ho mohou integrovat do svého IDE (Eclipse) a samotná Business Analýza je prováděna pouze na elementární úrovni, která by neměla být určena na např. reprezentační účely.

Mé doporučení pro začínající Business Analytiki by mohlo být začít s levným a dobrým UModel nástrojem. Nabízí standardní funkce a je jednoduchý pro učení prvních diagramů. Poté na kvalitnější a rychlejší práci doporučuji Enterprise Architect nebo Visual Paradigm for UML jako nástroje, které nabízí velmi široké možnosti a podporu za velmi dobrou cenu.

## CONCLUSION

There is no way to imagine today's software development without proper Business Analysis. However, within small project it is not necessary to invest money into expensive BA (also because developers may create essential analysis instead of Business Analyst), but it is still risky that any mistake may come up during development of even worse during deployment.

Business Analysis is mainly designed for big project where systems are enormous and proper understanding of solution essential.

Considering big number of CASE tools which allow creating of diagrams or processes for BA (quite popular is also for instance System Analyst, AnalystPro, Power Designer, RequisitePro or Visual Paradigm for UML), it is rather complicated to choose limited number to compare. I have chosen tools with which I had experience so my comparison could be well-founded (I have been working in BA for 3 years on several projects – Telefonica O2 CZ, Sitronics Telecom Solutions, Vodafone CZ, IBM).

Enterprise Architect is very convenient tool because its main purpose is to be used in Business Analysis (e.g. Visual Case is determined for Database modelling more than for BA). Its wide range of possibilities (testing, project management features) supports work in teams as also work of individual analysts. Low price and excellent user interface with popularity create mix of attributes which may appreciate every business analyst. However I would recommend EA for more experienced users who could properly use all of its capabilities.

Microsoft Office Visio is also very sophisticated CASE tool of globally popular company. One of the biggest advantages is high online and integration support (tutorials, videos, presentation and possibility of integration with other Microsoft applications). Visio has even higher number of diagrams and possibilities than EA. This may be also limitation, because many users may not use all capabilities which Visio offers and for lesser price

have satisfied outputs with other products. Nevertheless Visio has one of the prettiest diagrams of all CASE tools.

UModel is little bit different from the previous two competitors. It doesn't has so sophisticated UI, however for standard needs of BA is rather enough. Its simplicity and accessibility for good price may be interesting for many Business Analysts.

Visual Case may be rather specific database modelling CASE tool, however it allows user to create all UML diagrams and models. Thanks to this combination Visual Case is excellent tool for database project where it is necessary to do business analysis. In this respect it could be the best choice of all other tools.

Visible Analyst is the last of CASE tools presented in this work. It offers standard functions with fast and simple UI. Unfortunately I have found some critical bugs in this software which caused the termination of VA even when diagram was unsaved. It is also possible to download just four-day trial version (others may be tested for month or more). Therefore I think that this product needs some time to be properly developed, than It could be strong concurrent of other CASE tools in this work.

Visual Paradigm for UML is very sophisticated CASE tool. It is included in Suite consisting of several different programs which could cover all projects' needs (from analysis and methodology requirements to testing and deployment). Its brilliant User Interface makes easy work even with highly sophisticated requirements on diagram edition. Thanks to high support and popularity (also awards) is Visual Paradigm very good choice for experienced analysts. For beginners I would recommend little bit cheaper but worse products (UModel or EA).

Poseidon for UML is probably one of the worst competitors in this work. Terrible User Interface makes work very slow and chaotic. This tool is mainly aimed for developers,

who can integrate Poseidon into favourite IDE (Eclipse) and do Business Analysis just on elementary level and not for representative purposes.

My recommendation for beginning Business Analyst could be to start with cheap and good UModel. It offers basic functionality which is enough for learning of modeling first diagrams. Than for proper and fast work I recommend Enterprise Architect or Visual Paradigm for UML as tools which offer wide range of possibilities and features for very good price.

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**LIST OF SYMBOLS AND ABBREVIATIONS**

BA	Business Analysis
BPMN	Business Process Modeling Notation
CASE	Computer Assisted Software Engineering
CCTA	Central Computer and Telecommunications Agency
CVS	Concurrent Version System
EA	Enterprise Architect
FAQ	Frequently Asked Questions
IDE	Integrated Development Environment
IIBA™	International Institute of Business Analysis
IT	Information Technology
ITIL	Information Technology Infrastructure Library
JDBC	Java Database Connectivity
MSDN	Microsoft Developer Network
ODBC	Open Database Communication
OMG	Object Management Group
RUP	Rational Unified Process
SVN	Subversion
SQL	Structured Query Language
UI	User Interface
UML	Unified Modeling Language
VA	Visible Analyst
VP-UML	Visual Paradigm for UML
WYSIWYG	Slang for What You See Is What You Get
XML	eXtensible Markup Language

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## **LIST OF APPENDIXES**

A I – Summary Comparison Table

## APPENDIX A I: SUMMARY COMPARATION TABLE

Products	Enterprise Architect	Microsoft Office Visio	UModel	Visual Case	Visible Analyst	Visual Paradigm for UML	Poseidon for UML
<b>Features</b>							
Support of UML 2.0	Yes - full	Yes - full	Yes - full	Yes - full	Yes - full	Yes - full	Yes - full
Support of UML 2.1	Yes - full	Yes - full	Yes - full	No	Yes - full	Yes - full	No
BPMN support	Yes	No	No	No	Yes	Yes	No
<b>User Interface</b>							
Template support	Yes - high	Yes – very high	Yes - standard	Yes - weak	Yes - standard	Yes – high	Yes - standard
Traceability (undo)	Yes	Yes	Yes	Yes	No	Yes	Yes
Traceability (redo)	Yes	Yes	Yes	Yes	No	Yes	Yes
Toolbar modification	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Multi-lingual dictionary	No	Yes	No	No	No	Yes	No
Multi-lingual tool	Yes	Yes	No	No	Yes	Yes	Yes
UML Syntax control	Yes	No	Yes	No	Yes	Yes	No
Spell Checker	Yes	Yes	No	Yes	No	Yes	Yes
<b>Documentation</b>							
Tutorial	No	Yes	No	No	No	No	Yes
FAQ	Yes	Yes	Yes	No	Yes	Yes	Yes
Project examples	Yes	Yes	No	No	No	Yes	Yes
Web support (forum, discussions etc.)	Yes - high	Yes – very high	Yes - standard	Yes - weak	Yes - weak	Yes - high	Yes - high
<b>Developer's support</b>							

Code generation	Yes	Yes	Yes	No	Yes	Yes	Yes
Reverse Engineering	Yes	Yes	Yes	No	Yes	Yes	Yes
Support for testing	Yes	No	No	No	No	No	No
Support for Requirement mgmt.	Yes	No	No	No	No	Yes	Yes
Integration with other programs (Eclipse...)	Yes	Yes	No	No	No	Yes	Yes
<b>Database support</b>							
Supports work with databases	Yes - high	Yes - high	No	Yes - very high	Yes - high	Yes	Yes - weak
Database reverse-engineering	Yes	Yes	No	Yes	Yes	Yes	No
Work with SQL	No	No	No	Yes	No	No	No
<b>Export/import</b>							
CVS support	Yes	Yes	No	No	Yes	Yes	No
Subversion (SVN) support	Yes	Yes	No	No	Yes	Yes	No
<b>Security</b>							
Lock diagram	Yes	Yes	No	No	Yes	Yes	No
Privilege system	Yes	Yes	No	No	Yes	No	No
Administrator role	Yes	Yes	No	No	Yes	No	No
<b>Other</b>							
Multi-user tool	Yes	Yes	No	No	Yes	Yes	No
Popularity	Yes - high	Yes - high	No	No	Yes - standard	Yes - high	No
<b>Test Use Case diagram</b>							
Approximate time	6 min.	10 min.	Approx. 10 min.	9 min.	11 min.	6 min.	11 min.