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Experimental project WorkSpace Manager

Motivation

The idea of developing the WorkSpaceManager application appeared when trying to use the SolutionManager application, which is part of PDC's professional version of Visual Prolog.

The need for its use was due to the fact that there were simultaneously several interdependent projects in the work that needed to be compiled together, run for execution. In particular, the situation of using Visual Prolog system directly "from the pen" of its developers, when it was necessary to compile a whole lot of projects (there were about 50 of them, including various small examples and tests)
Did not arrange a few moments:

- Work only with projects of the Visual Prolog system, while it was required to use various batch files or even different editors;
- It was impossible to change the order of processing projects;
- Impossibility of grouping projects;
- Adding projects from one directory did not allow to exclude some of them from consideration and again to change the order of their processing;
- The inability to use relative addressing of projects in the disk space.

At the same time, we were interested in the following topics:

- Strict separation of the logical part of the application and its user interface;
- Microservices;
- Using the concept of plug-ins in applications;
- The ability to create remote services for creating and compiling Visual Prolog projects (the idea was once born in the discussion of Leo Schou-Jensen and Thomas Puls, in which I participated).

Therefore, the WorkSpaceManager (WSM) project brought together our needs and our architectural searches for applications based on Visual Prolog.

It is assumed on this project to develop techniques and tools for building full-fledged microservices.

The project before the first working version was developed by V. Yukhtenko (Prolog Development Center SPb), later Boris Belov took part in the work. In solving the tasks of http interaction, Andrey Basukinsky helped.

Functionality

Resource

The basic unit of processing in WSM is a file whose extension defines its type.

Over each file can be performed four operations "Oper1", "Oper2", "Oper3" "Oper4". The nature of each of the operations, with respect to a file of a certain type, is not strictly fixed and is determined by the user.

In the current implementation, these four operations are assigned the following names

- "Oper1" - "Open";
- "Oper2" - "Build";
- "Oper3" - "Build Completely";
- "Oper4" - "Run".

which is inspired by the basic operations on projects in the Visual Prolog system.
So, for the project file of the Visual Prolog system having the extension .vipprj, it is assumed that

- The Open operation causes the project to open in the Visual Prolog system.
- The "Build" operation passes this file to VipBuilder.exe, which builds the project,
- The "Build Completely" operation passes this file to VipBuilder.exe, but which performs rebuilding (Rebuild All) of the project,
- The "Run" operation calls execution of the built-in application.

For a file with any other extension (of another type), the operation semantics can be any other, but in general, each operation looks like a command line in the MSWindows system

<executing program> <prefix> <resource> <suffix>

So for the operation "Build" the project file test.vipprj of the Visual Prolog system it looks like this (with accuracy to the routes):

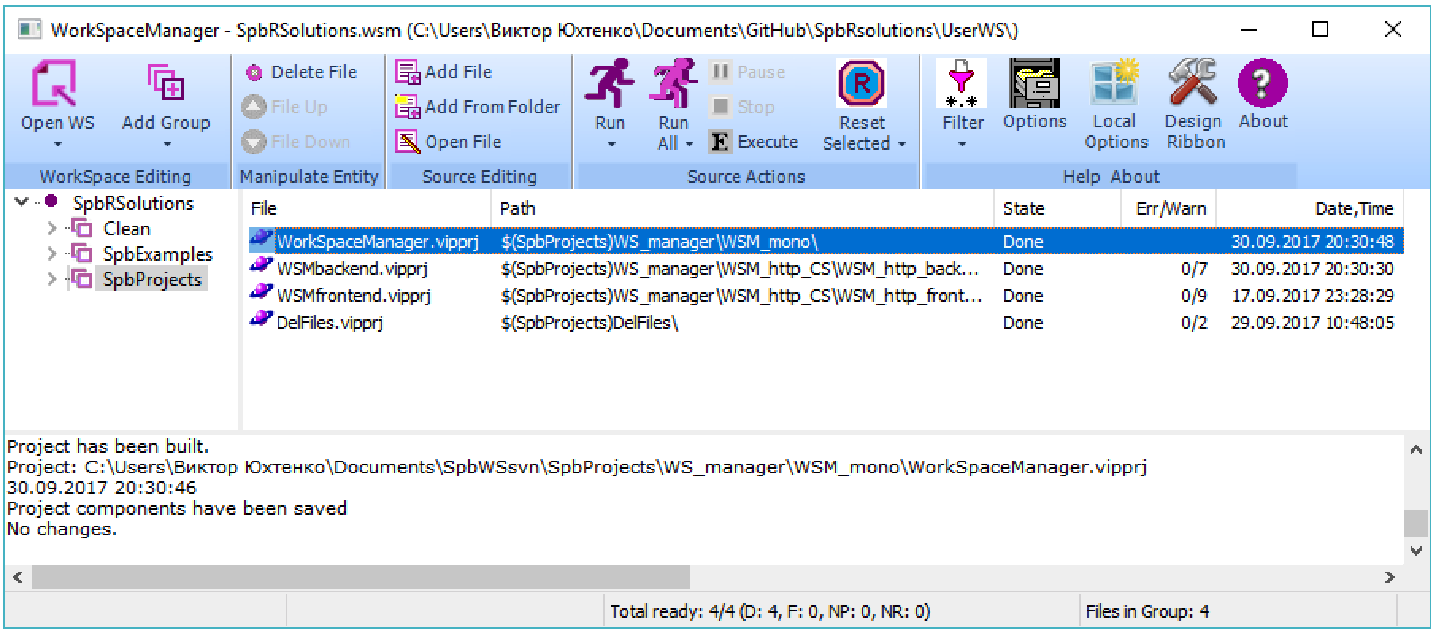
vipBuilder.exe / build test.vipprj

what causes the building of the project **test.vipprj** and the creation of the executable application **test.exe**, in the directory set by the project.

WorkSpace

WorkSpace contains a set of files that are relevant to the user. The user adds and removes files from the workspace as needed.

WSM allows you to structure a set of files, grouping according to the criteria defined by the user. The structure is represented as a tree and is not a file system mapping.
The WorkSpace structure and the results of file processing are saved in a file with the extension .wsm in XML format.
The general view of the application is shown in the following figure:



WorkSpaceManager - SpbRSolutions.wsm (C:\Users\Виктор Юхтенко\Documents\GitHub\SpbRsolutions\UserWS\)

File	Path	State	Err/Warn	Date,Time
WorkSpaceManager.vipprj	$(SpbProjects)WS_manager\WSM_mono\	Done		30.09.2017 20:30:48
WSMbackend.vipprj	$(SpbProjects)WS_manager\WSM_http_CS\WSM_http_back...	Done	0/7	30.09.2017 20:30:30
WSMfrontend.vipprj	$(SpbProjects)WS_manager\WSM_http_CS\WSM_http_front...	Done	0/9	17.09.2017 23:28:29
DelFiles.vipprj	$(SpbProjects)DelFiles\	Done	0/2	29.09.2017 10:48:05

```
Project has been built.
Project: C:\Users\Виктор Юхтенко\Documents\SpbWSsvn\SpbProjects\WS_manager\WSM_mono\WorkSpaceManager.vipprj
30.09.2017 20:30:46
Project components have been saved
No changes.
```

Total ready: 4/4 (D: 4, F: 0, NP: 0, NR: 0)   Files in Group: 4

List of resources and tree

The main working stretch of the user is the file list on the right side of the form.
Here is the filename, the path to it, the processing status, the number of errors and warnings, during processing, and the time of the last processing.

There are four states of the result of processing:

- Done - completed successfully
- Failed - failed
- NoPath - the route to the file or the processing program was not found
- NoRule - the processing rule for this operation is not defined

Above each resource, one of the four described operations (Oper1, Oper2, Oper3, Oper4) that are valid for a resource of the appropriate type can be executed.
Above each file of the selected (marked) list, one of these operations can also be performed. Operations are performed in order of priority from top to bottom.
The tree on the left side of the form is a logical representation of the user about his workspace. Initially the tree contains only one node - the root, and all the resources of the right part (if any) belong to this node. The user can create an arbitrary tree structure

There are two types of tree nodes - a **group** and a **folder**.
A **group** can contain subgroups and it can have an arbitrary number of files. The group provides operations for adding, deleting files and moving them.
The **folder** corresponds to the disk space directory contains only those files (of declared types) that are contained in the directory and its subdirectories.
A folder can not contain groups. The user can move the files of the folder and (conditionally) delete them. Remoted files remain visible and change only the brightness of the row on the screen. The user can return the file to the active state.

The right part of the form displays all files of the selected group on the left, including all files of all subgroups and folders. This allows you to perform operations on either all files in the workspace, or only over the part currently in the user's focus.

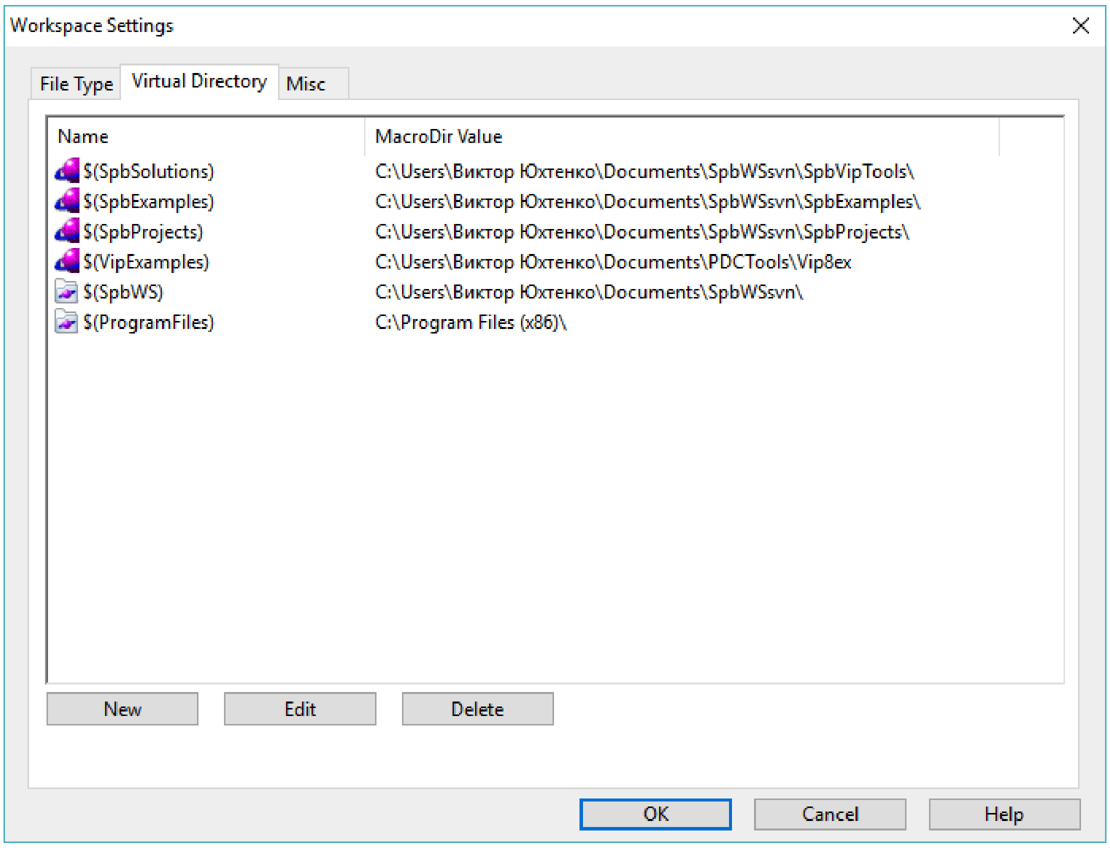
Above the file list and above the tree, Drag-And-Drop operations can be performed, which allows you to quickly reorder priorities and processing strategy. Moving with the keyboard is also possible.

Virtual directories

The user can use both absolute and relative addressing of files in the disk space. Relative addressing is similar to that one, used in Visual Prolog. The name of the virtual directory is preliminarily determined and this name is used as a prefix in the file path.

Relative addressing allows you to move the workspace from one computer to another, redefining only the location of virtual directories.

The user can define an unlimited number of virtual directories and edit their location on this computer. However, virtual directories installed in the Visual Prolog system can not be changed by WSM. The following figure shows the editor of virtual directories.



Name	MacroDir Value
$(SpbSolutions)	C:\Users\Виктор Юхтенко\Documents\SpbWSsvn\SpbVipTools\
$(SpbExamples)	C:\Users\Виктор Юхтенко\Documents\SpbWSsvn\SpbExamples\
$(SpbProjects)	C:\Users\Виктор Юхтенко\Documents\SpbWSsvn\SpbProjects\
$(VipExamples)	C:\Users\Виктор Юхтенко\Documents\PDCTools\Vip8ex
$(SpbWS)	C:\Users\Виктор Юхтенко\Documents\SpbWSsvn\
$(ProgramFiles)	C:\Program Files (x86)\

Language

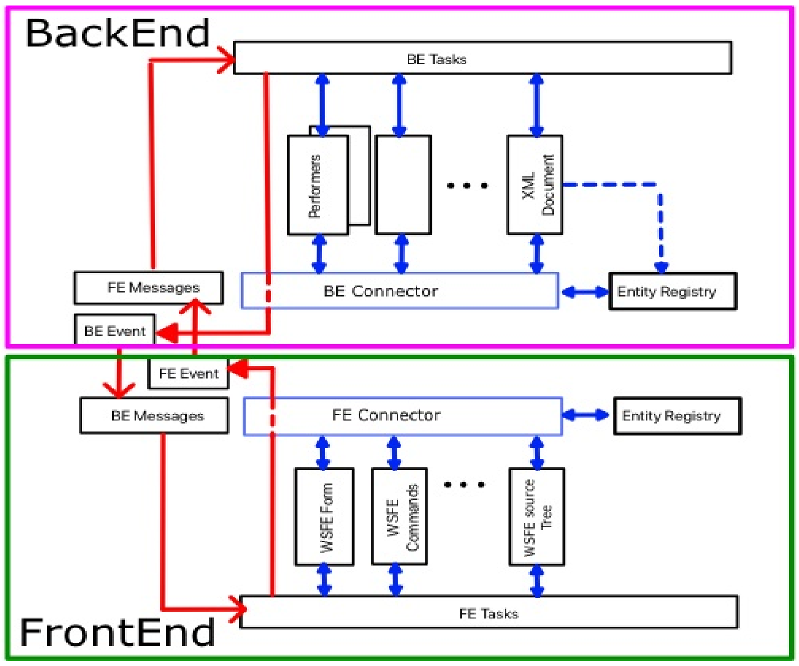
The user interface language can be localized for user preferences.
The language setting file LanguageWSM.xml is located (and always there) in the executable file directory.
The base language of the interface is English, but most of the form inscriptions, dialogs and messages can be reassigned by editing the LanguageWSM.xml file.
Switching the language of the user interface is in the Colors section of the "WorkSpace Settings" dialog.

Architecture

The architecture of the application from the very beginning of development was focused on the strict separation of the user interface from the logical part of the application in the calculation for the subsequent use of the technology of micro services.

Therefore, the first implementation of the application immediately was done as separated into **FrontEnd** and **BackEnd**.

The structure of the mono application is shown in the following figure:



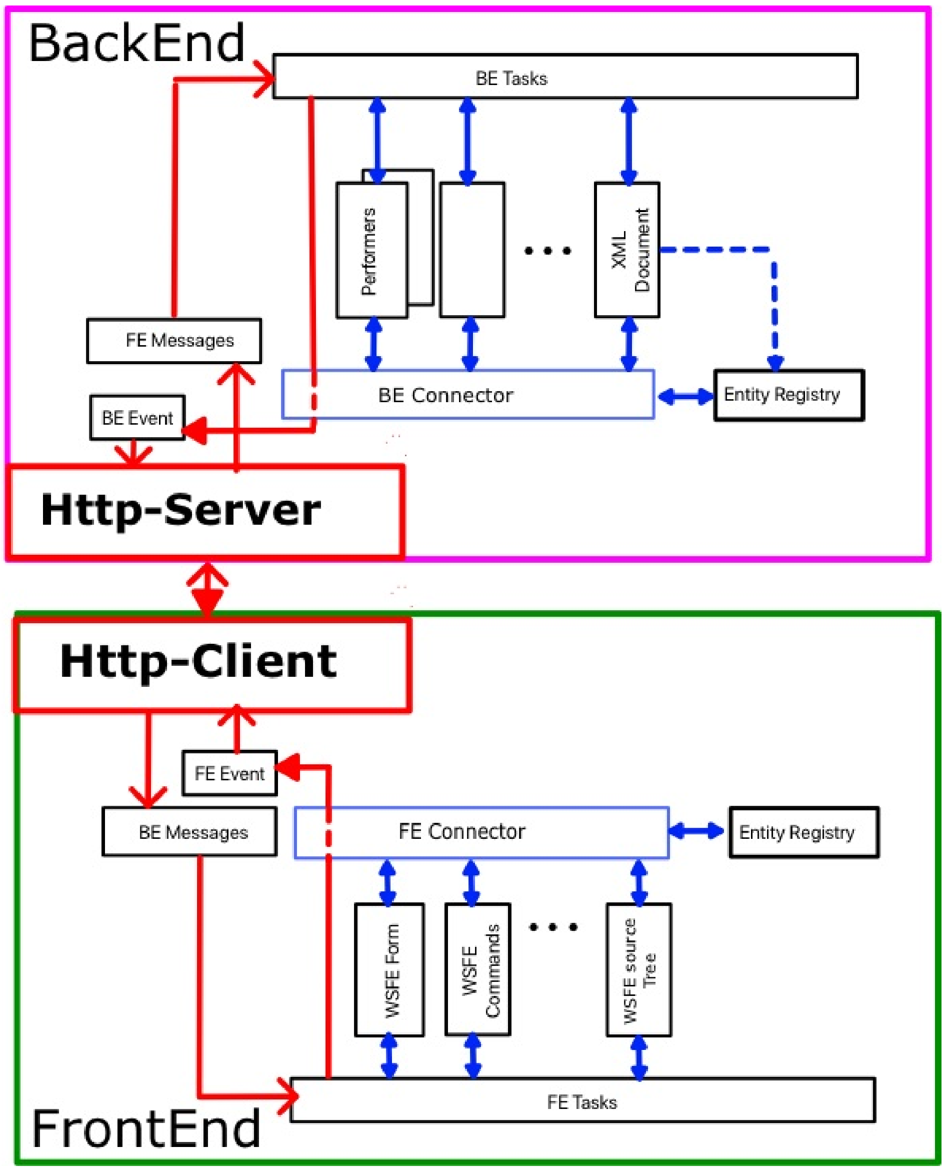
Here the blue arrows show the connections inside BackEnd and FrontEnd respectively, and red - the connection between BackEnd and FrontEnd.

Within these structures, the modules access other modules via the BE (FE) -Connector, which accesses the Entity Registry.

Events originating on the initiative of the opposite side are processed by the BE (FE) Messages module, which executes the corresponding predicates of the BE (FE) Tasks module. That, in turn, refers to the rest of the BackEnd modules (FrontEnd). Having received data for the opposite side, the BE (FE) Tasks module sends a message through the BE (FE) Event module. The opposite side subscribes to the data source events for it.

The initiator of data exchange is always FrontEnd, which initiates execution of tasks in BackEnd. The work is done in asynchronous mode: after sending the request, FrontEnd returns to its work. BackEnd, upon receiving the request, performs a task and, possibly, initiates data transfer to FrontEnd. This can be either one message or a sequence of messages that need to be processed in FrontEnd.

This structure of the application made it possible to pass almost painlessly to the variant of separate applications (BackEnd and FrontEnd) interacting via the http protocol, adding and including the Http-Server and the Http-Client.
The structure of such an application is shown in the following figure



Http-Client and Http-Server themselves convert data and organize their transfer between BackEnd and FrontEnd.

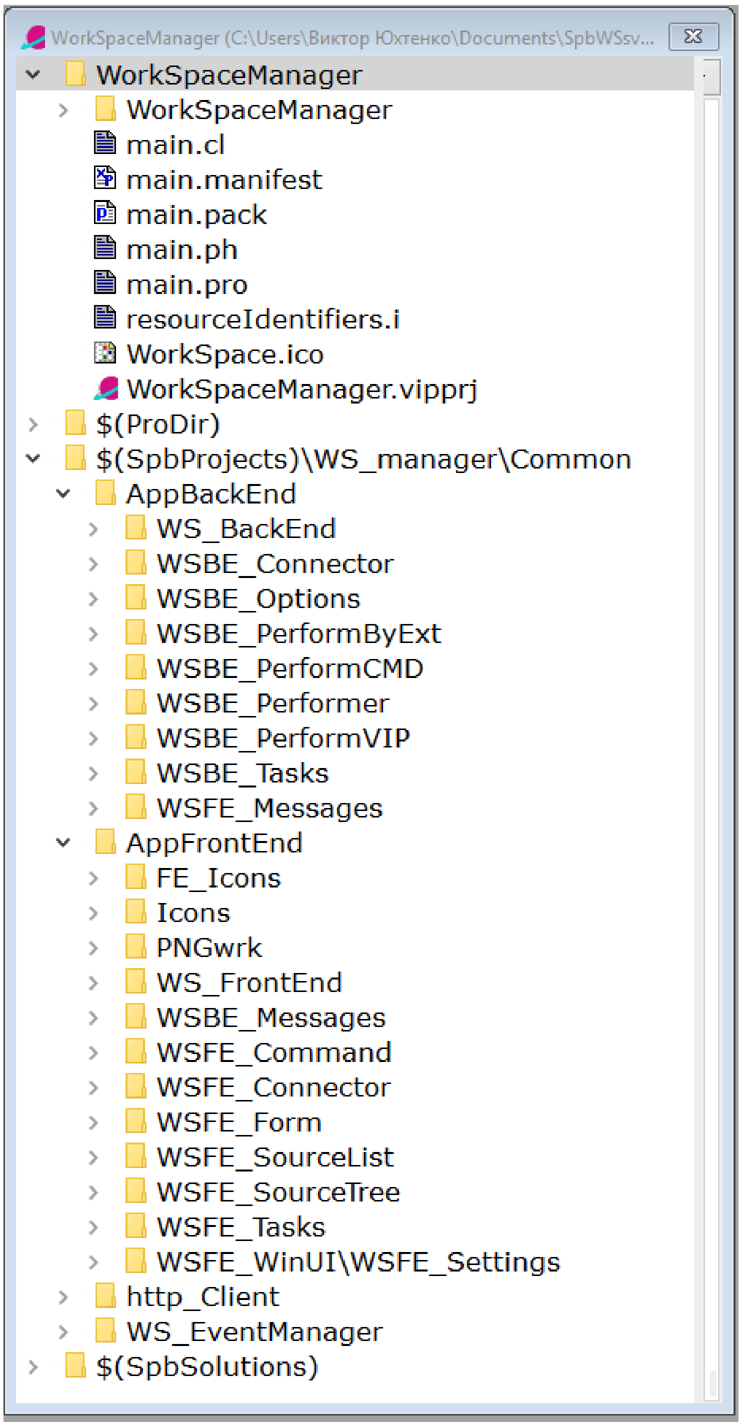
Technologies

In the development of WSM, the technologies PDC VIP v.8, technologies and techniques of in-house development were used:

- Registering objects in public memory;
- Organization of data storage in XML format;
- Exchange of data on the basis of events (Event Messaging) in the format namedValueList;
- Organization of form space on the basis of split Screen;
- Organization of management based on ribbon-panel;
- Client-server architecture;
- Data exchange via http protocol;
- Data exchange in Json format (when using http protocol);
- Use of message queues in conditions of multi-threaded access (when working on http protocol).

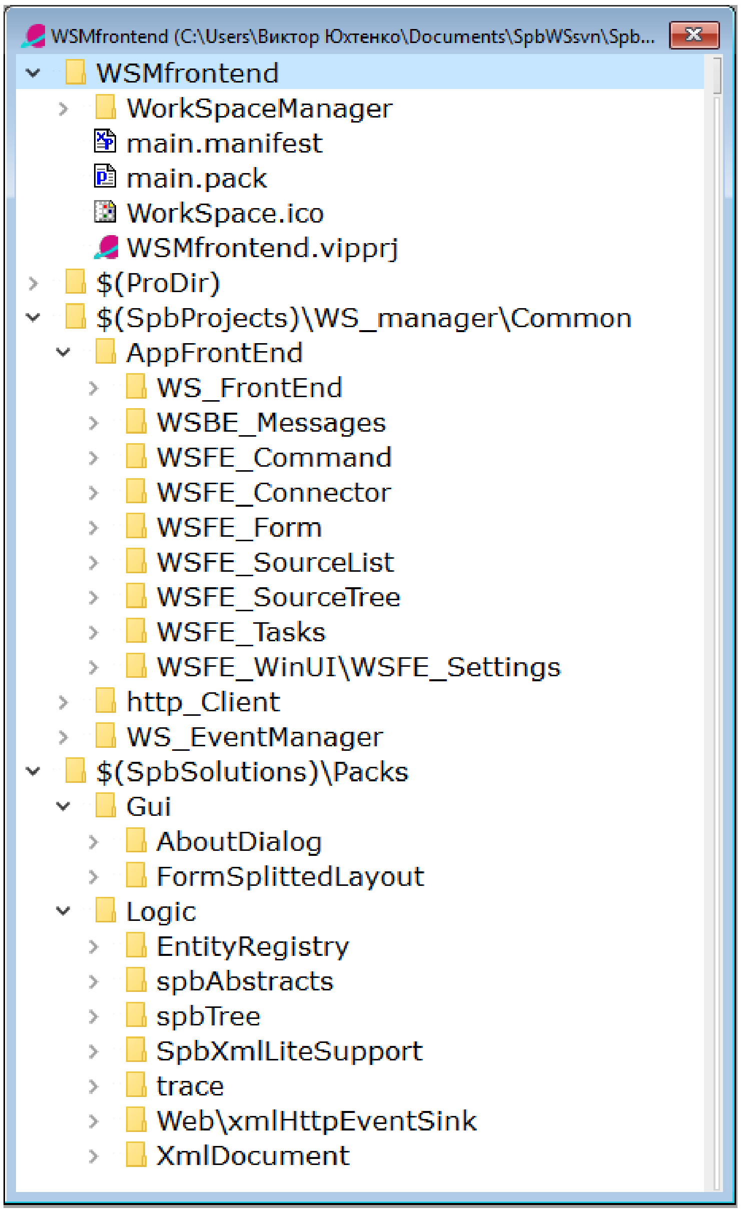
The project application structure

The structure of the mono application is given below.



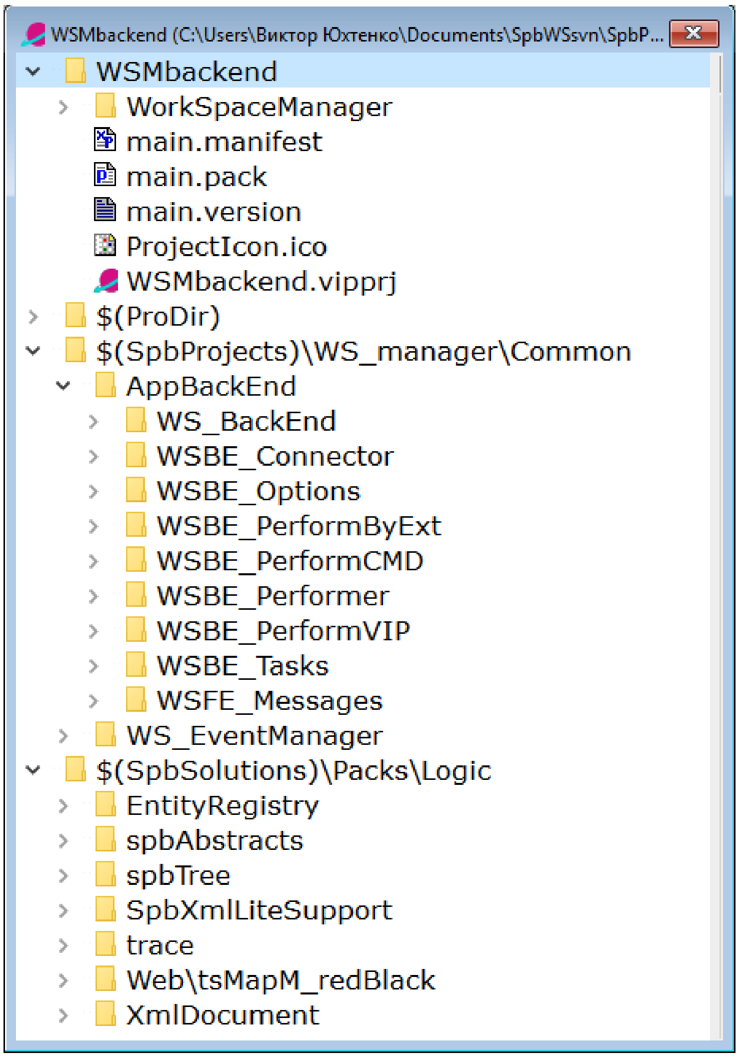
```
WorkSpaceManager (C:\Users\Виктор Юхтенко\Documents\SpbWSsv...
v WorkSpaceManager
    > WorkSpaceManager
      main.cl
      main.manifest
      main.pack
      main.ph
      main.pro
      resourceIdentifiers.i
      WorkSpace.ico
      WorkSpaceManager.vipprj
> $(ProDir)
v $(SpbProjects)\WS_manager\Common
    v AppBackEnd
        > WS_BackEnd
        > WSBE_Connector
        > WSBE_Options
        > WSBE_PerformByExt
        > WSBE_PerformCMD
        > WSBE_Performer
        > WSBE_PerformVIP
        > WSBE_Tasks
        > WSFE_Messages
    v AppFrontEnd
        > FE_Icons
        > Icons
        > PNGwrk
        > WS_FrontEnd
        > WSBE_Messages
        > WSFE_Command
        > WSFE_Connector
        > WSFE_Form
        > WSFE_SourceList
        > WSFE_SourceTree
        > WSFE_Tasks
        > WSFE_WinUI\WSFE_Settings
    > http_Client
    > WS_EventManager
> $(SpbSolutions)
```

And here are the project structures for Http-FrontEnd and Http-BackEnd



WSMfrontend (C:\Users\Виктор Юхтенко\Documents\SpbWSsvn\Spb...

```
WSMfrontend
  WorkSpaceManager
  main.manifest
  main.pack
  WorkSpace.ico
  WSMfrontend.vipprj
$(ProDir)
$(SpbProjects)\WS_manager\Common
  AppFrontEnd
    WS_FrontEnd
    WSBE_Messages
    WSFE_Command
    WSFE_Connector
    WSFE_Form
    WSFE_SourceList
    WSFE_SourceTree
    WSFE_Tasks
    WSFE_WinUI\WSFE_Settings
  http_Client
  WS_EventManager
$(SpbSolutions)\Packs
  Gui
    AboutDialog
    FormSplittedLayout
  Logic
    EntityRegistry
    spbAbstracts
    spbTree
    SpbXmlLiteSupport
    trace
    Web\xmlHttpEventSink
    XmlDocument
```



```
WSMbackend (C:\Users\Виктор Юхтенко\Documents\SpbWSsvn\SpbP...
WSMbackend
  WorkSpaceManager
  main.manifest
  main.pack
  main.version
  ProjectIcon.ico
  WSMbackend.vipprj
$(ProDir)
$(SpbProjects)\WS_manager\Common
  AppBackEnd
    WS_BackEnd
    WSBE_Connector
    WSBE_Options
    WSBE_PerformByExt
    WSBE_PerformCMD
    WSBE_Performer
    WSBE_PerformVIP
    WSBE_Tasks
    WSFE_Messages
  WS_EventManager
$(SpbSolutions)\Packs\Logic
  EntityRegistry
  spbAbstracts
  spbTree
  SpbXmlLiteSupport
  trace
  Web\tsMapM_redBlack
  XmlDocument
```