



IX ITALIAN STATA USERS GROUP MEETING
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Advanced Stata Dialog Programming with

VISUA

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Introducing Visua



RAD (rapid application development) software for Stata dialog programming

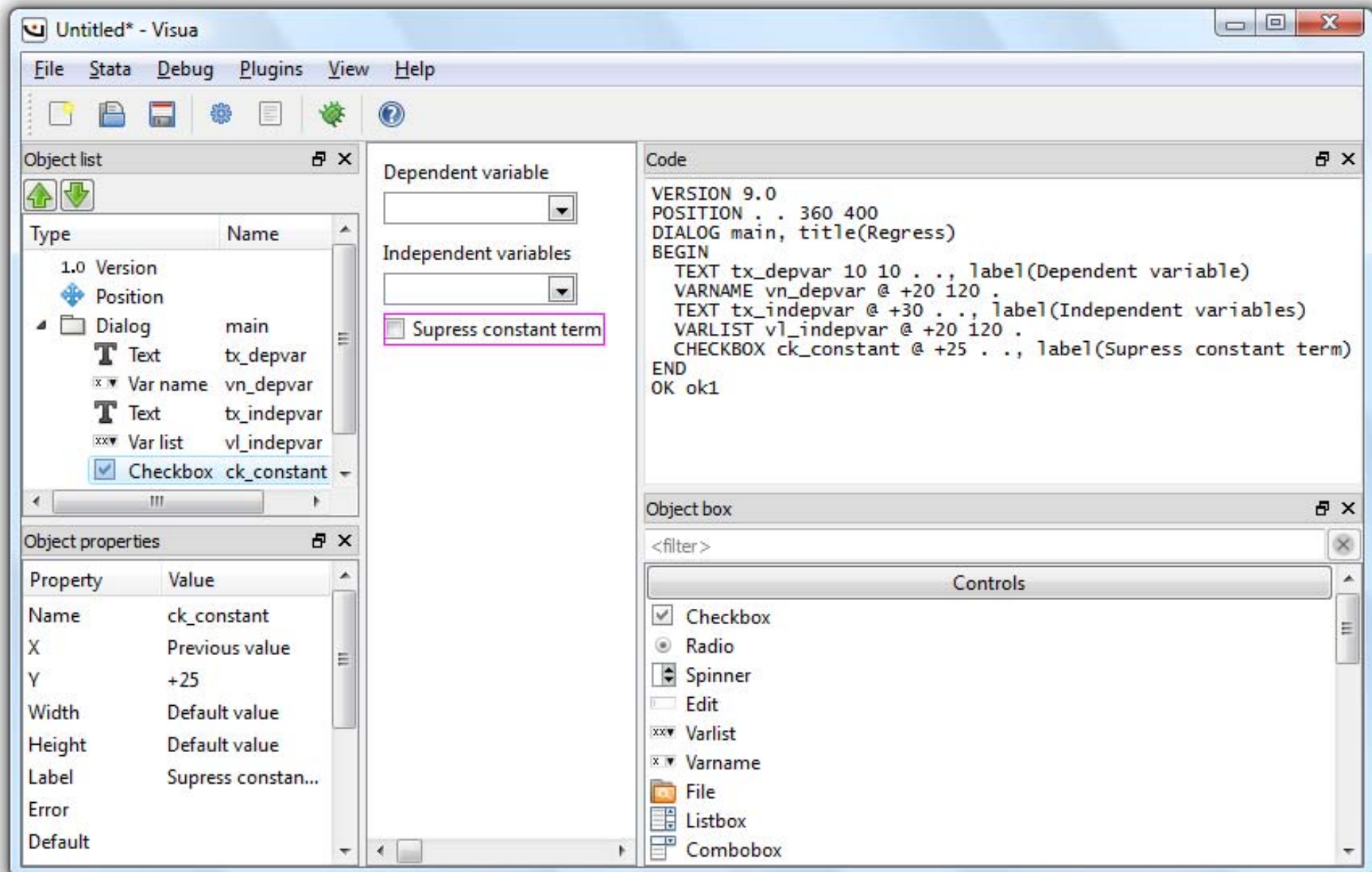


Provides you with a friendly GUI (graphical user interface) you can use to rapidly create Stata dialog boxes

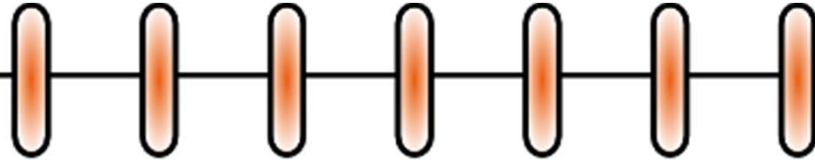


Stand-alone software written in C++

A first look at Visua



Presentation outline



1 Dialog programming basics

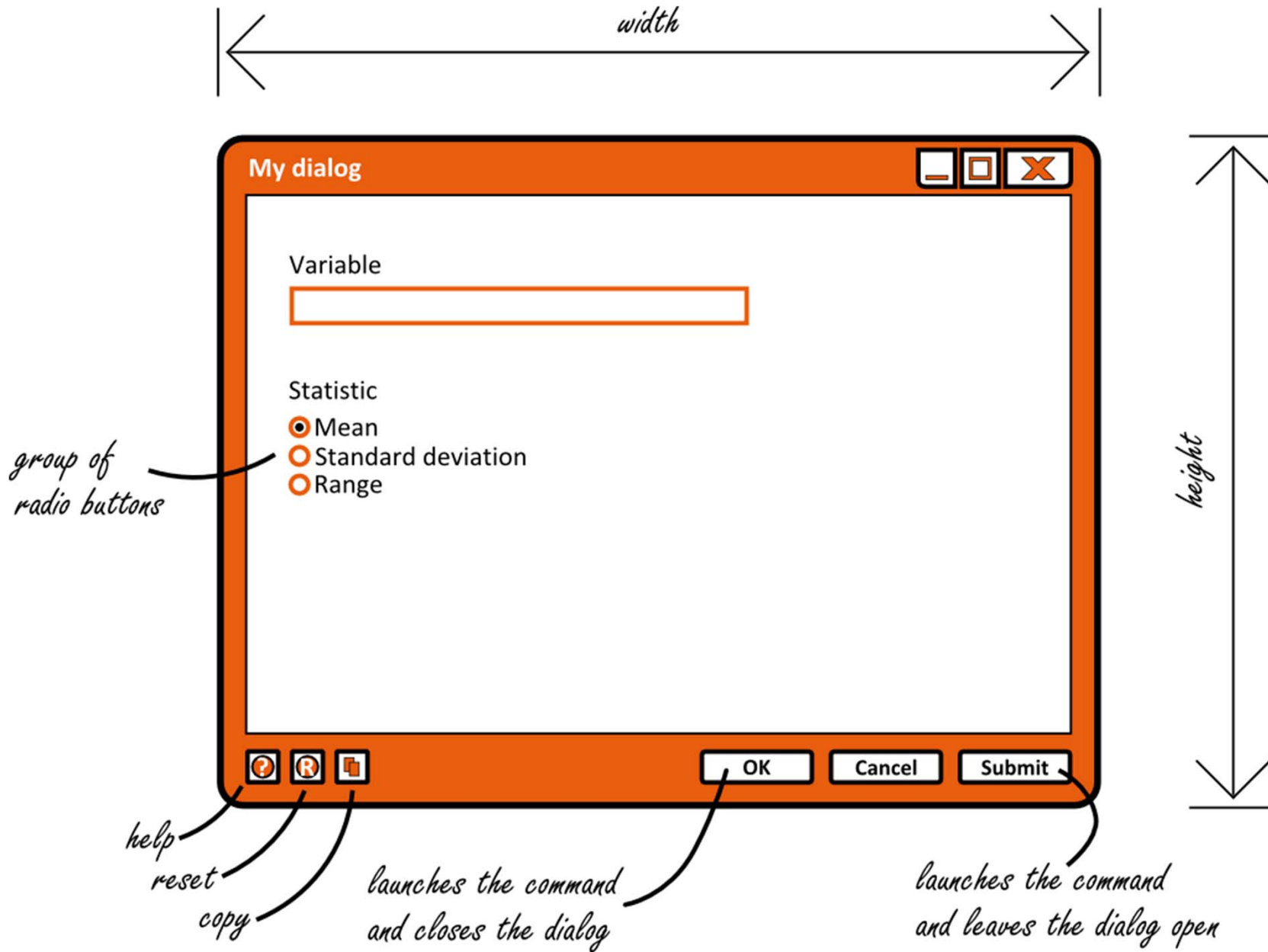
2 Visua basics

3 Advanced features of Visua:

- debugger

- plugins

Stata dialog programming basics



Hello, world!

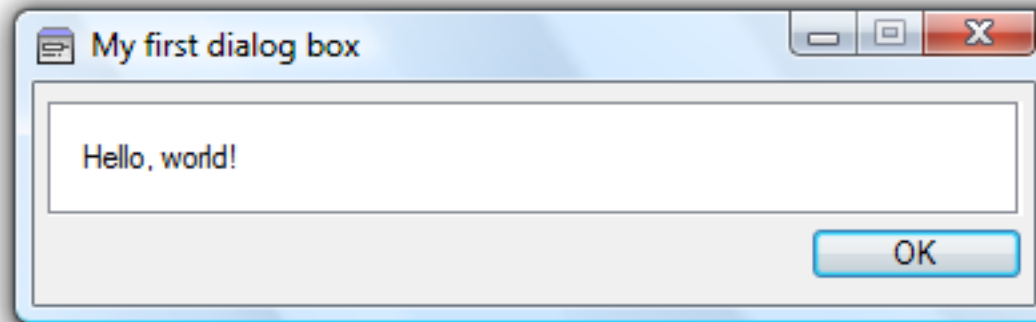
helloworld.dlg

```
VERSION 9.0
POSITION . . 360 40

DIALOG main, title(My first dialog box)
BEGIN
    TEXT tx_helloworld 10 10 . ., label(Hello, world!)
END

OK ok
```

Please, always add a blank line
at the end of the script file



How to execute the “Hello, world” dialog box

1) Save “helloworld.dlg” in a valid ado directory

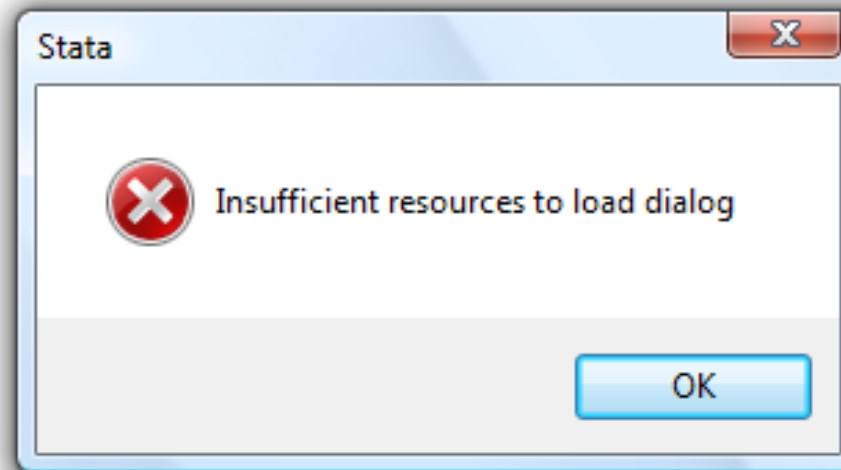
2) Launch the dialog:

```
db helloworld
```

Two common problems when programming dialogs

1) Unexpected behaviour of the dialog

2) The following error message:



The solution

Use `discard` before launching the dialog

```
discard
db helloworld
```

What `discard` does

`discard` clears the class system memory and prevents the dialog engine from entering into an unstable state

A useful tip

```
program db_
  syntax name(name=dialogname id="dialog name")
  discard
  db `dialogname`
end
```



Use

```
db_ helloworld
```

Hello, user!

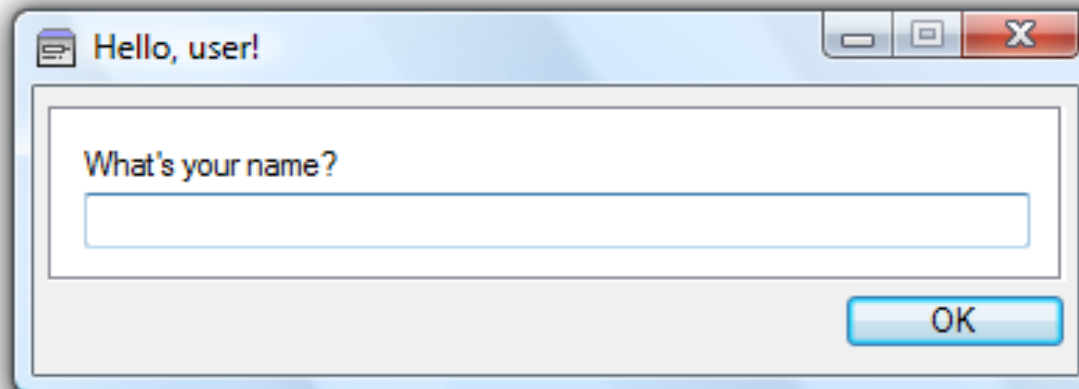
hellouser.dlg

```
VERSION 9.0
POSITION . . 360 60

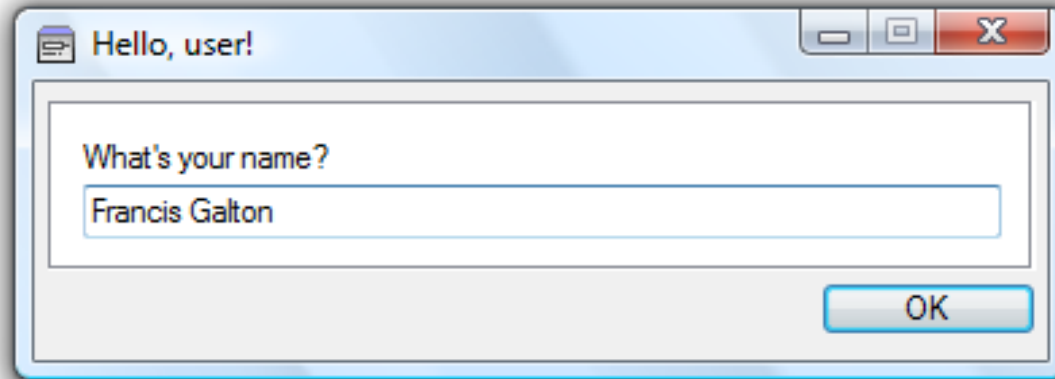
DIALOG main, title(Hello, user!)
BEGIN
    TEXT tx_question 10 10 . ., label(What's your name?)
    EDIT ed_name @ +20 340 .
END

OK ok

PROGRAM command
BEGIN
    put `display "Hello, " main.ed_name `"!""`
END
```



The “Hello, user!” dialog box in action



1) The user clicks on the OK button



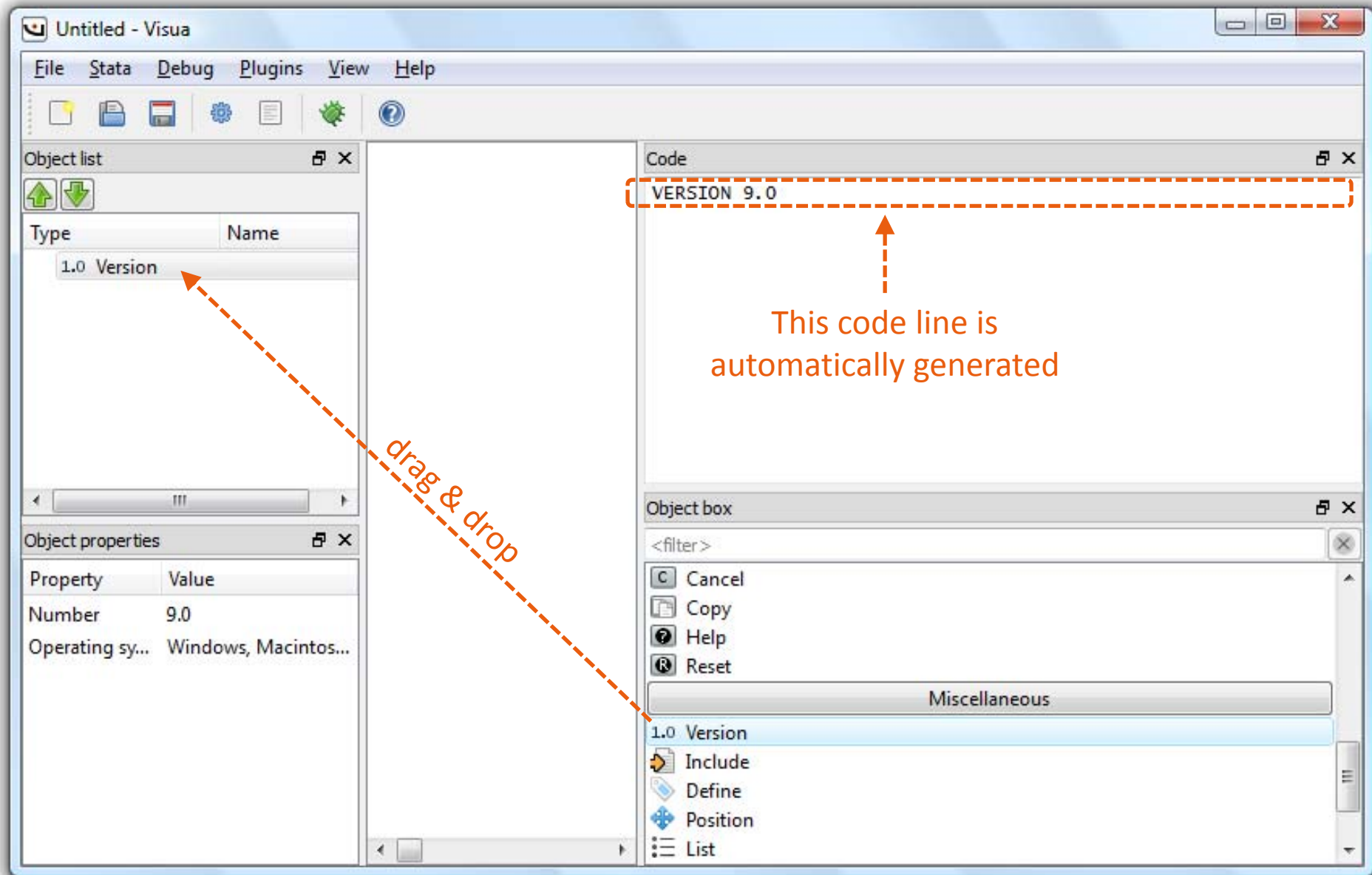
2) The return string is constructed



3) The return string is executed:

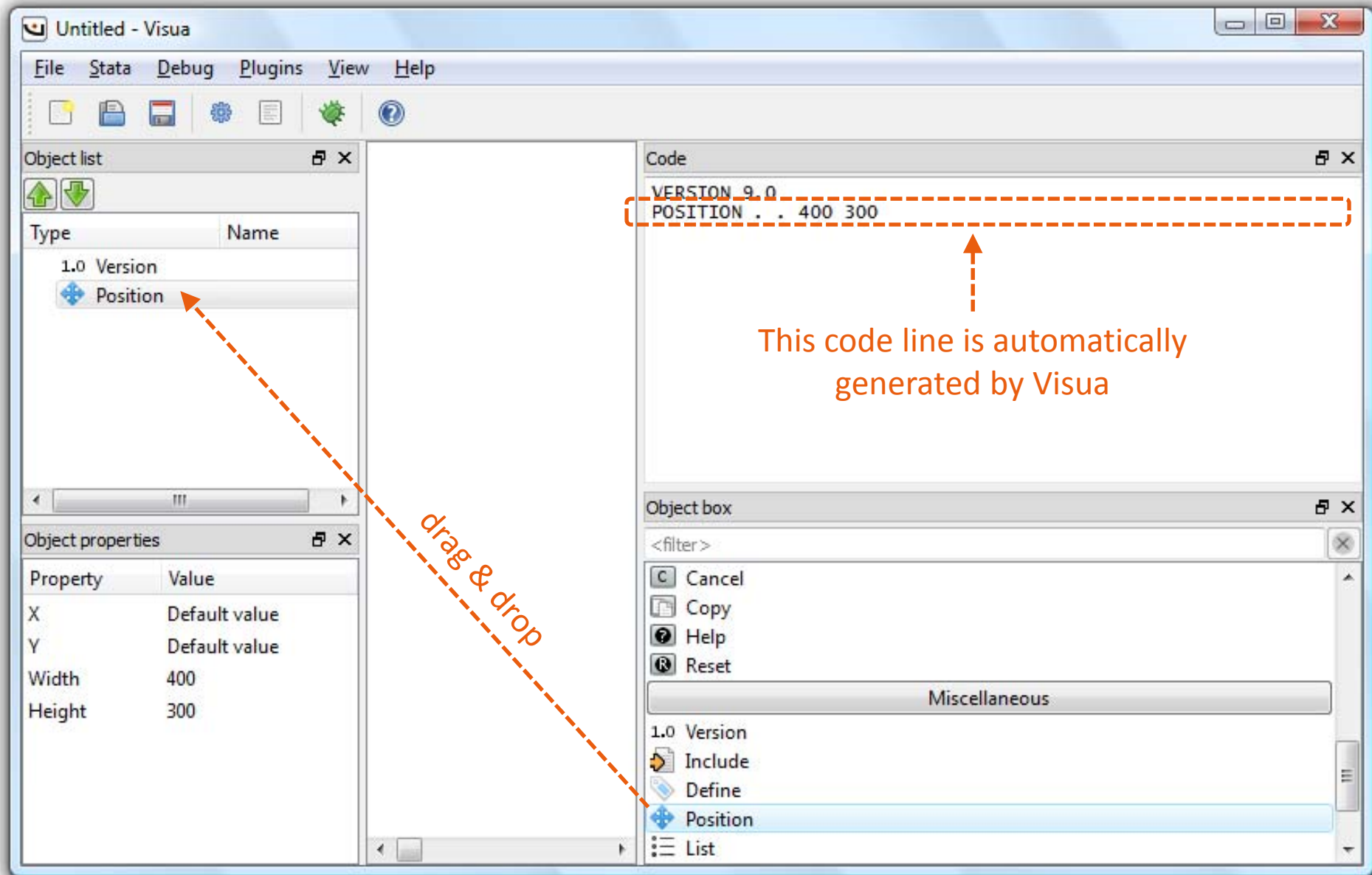
```
. display "Hello, Francis Galton!"  
Hello, Francis Galton!
```

The “Hello, world!” dialog box in Visua



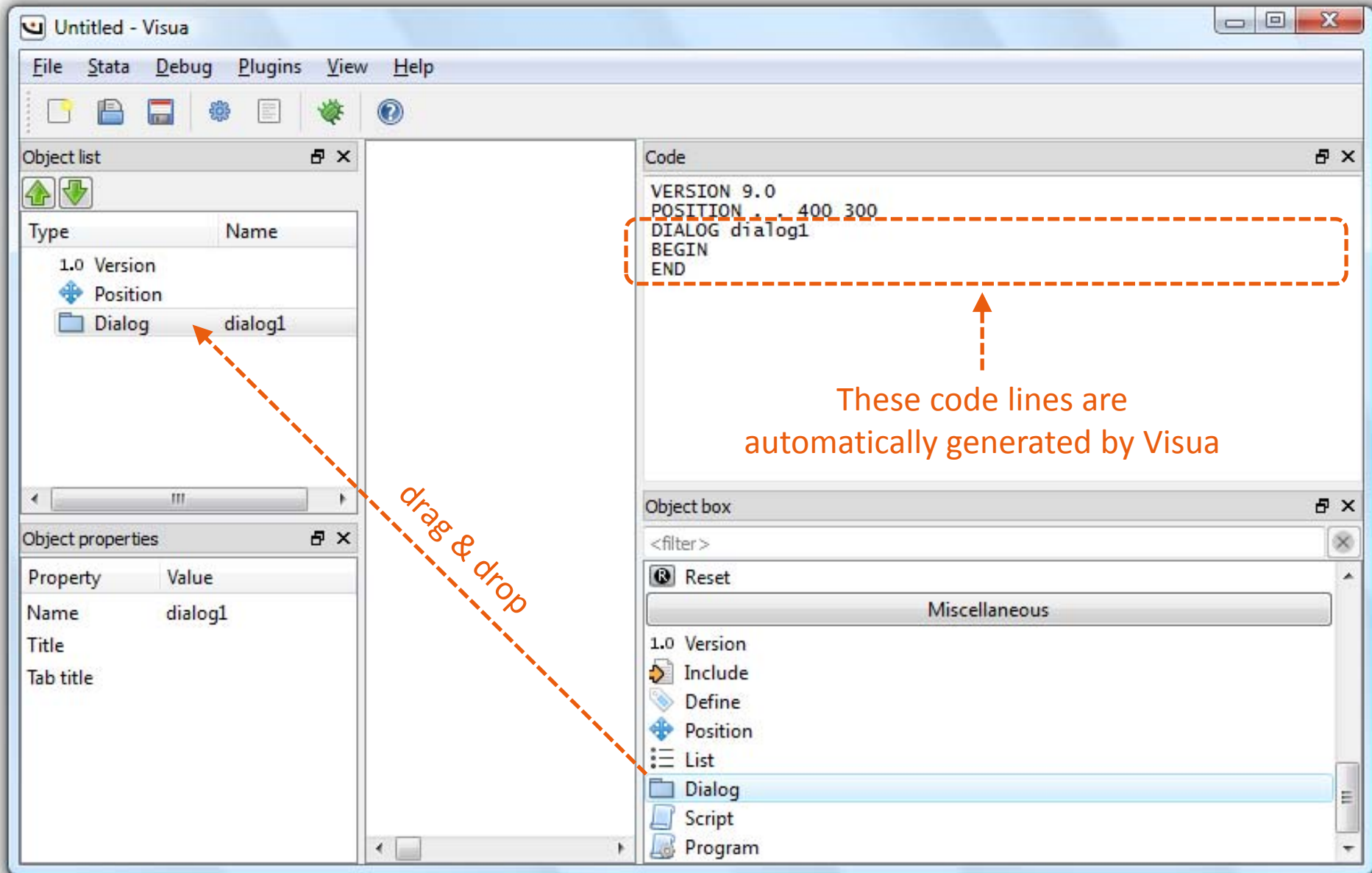
Drag the “Version” object from the object box and drop it into the object list

The “Hello, world!” dialog box in Visua



Drag the “Position” object from the object box and drop it into the object list

The “Hello, world!” dialog box in Visua



Drag the “Dialog” object from the object box and drop it into the object list

The “Hello, world!” dialog box in Visua

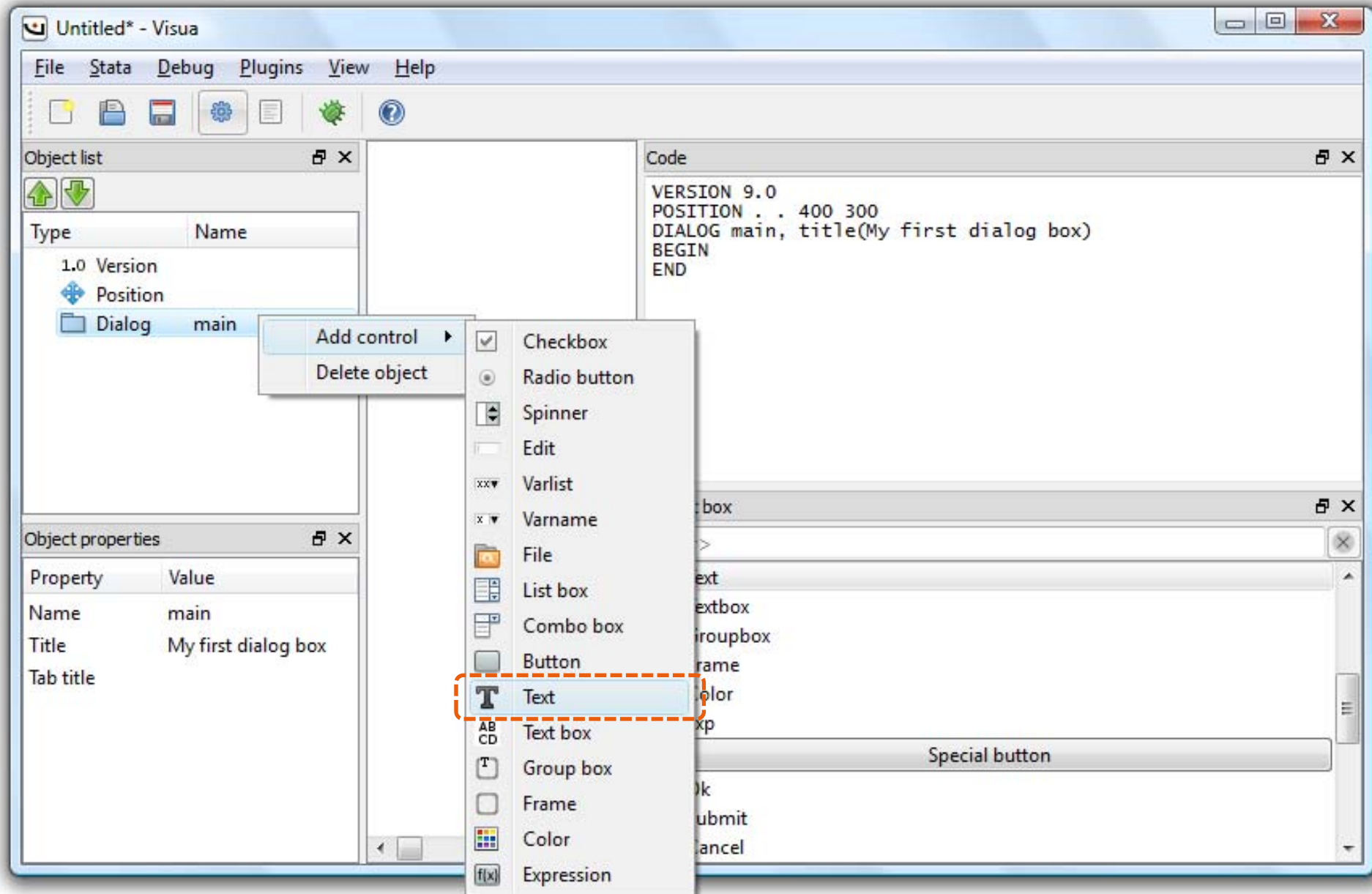
| Object properties | |
|-------------------|---------|
| Property | Value |
| Name | dialog1 |
| Title | |
| Tab title | |



| Object properties | |
|-------------------|---------------------|
| Property | Value |
| Name | main |
| Title | My first dialog box |
| Tab title | |

Select the “Dialog” object and modify its properties (double click on each value to modify it)

The “Hello, world!” dialog box in Visua



Right click on the “Dialog” object, “Add control” ⇨ “Text”

The "Hello, world!" dialog box in Visua

The screenshot displays the Visua IDE interface with the following components:

- Object list:** A tree view showing the project structure. Under 'Dialog main', a 'Text text1' object is highlighted with a dashed orange box. An orange arrow points from this box to the 'Text' label in the central canvas.
- Code:** A text editor showing the following code:

```
VERSION 9.0
POSITION . . 400 300
DIALOG main, title(My first dialog box)
BEGIN
  TEXT text1 0 0 . ., label(Text)
END
```

The line `TEXT text1 0 0 . ., label(Text)` is enclosed in a dashed orange box.
- Object properties:** A table showing the properties of the selected 'Text' object:

| Property | Value |
|-----------|---------------------|
| Name | main |
| Title | My first dialog box |
| Tab title | |
- Object box:** A palette of UI controls including 'Text', 'Textbox', 'Groupbox', 'Frame', 'Color', 'Exp', and 'Special button'.

The visual appearance of the just created "Text" object

The “Hello, world!” dialog box in Visua

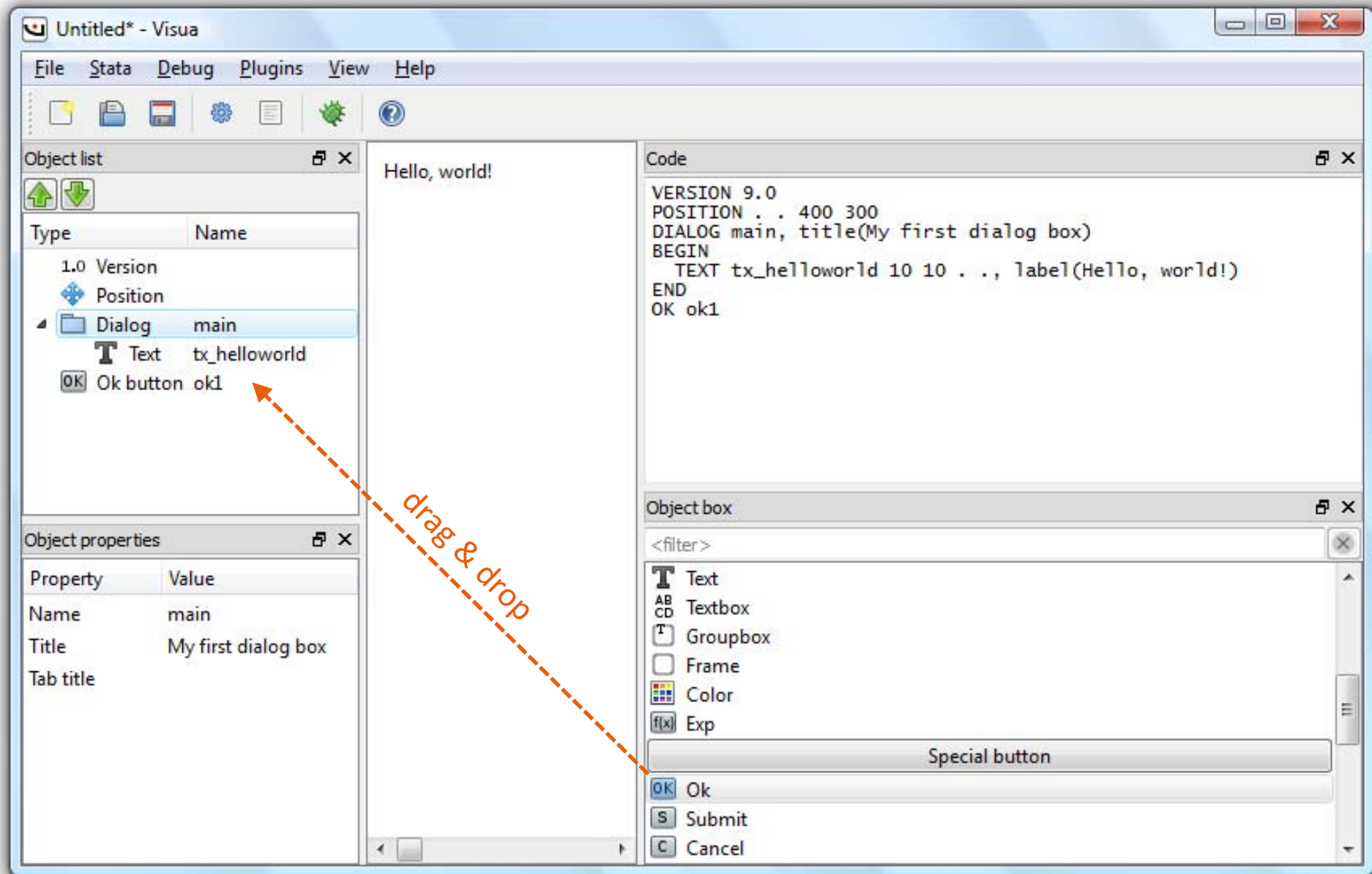
| Property | Value |
|-----------|---------------|
| Name | text1 |
| X | 0 |
| Y | 0 |
| Width | Default value |
| Height | Default value |
| Label | Text |
| Alignment | |



| Property | Value |
|-----------|---------------|
| Name | tx_helloworld |
| X | 10 |
| Y | 10 |
| Width | Default value |
| Height | Default value |
| Label | Hello, world! |
| Alignment | |

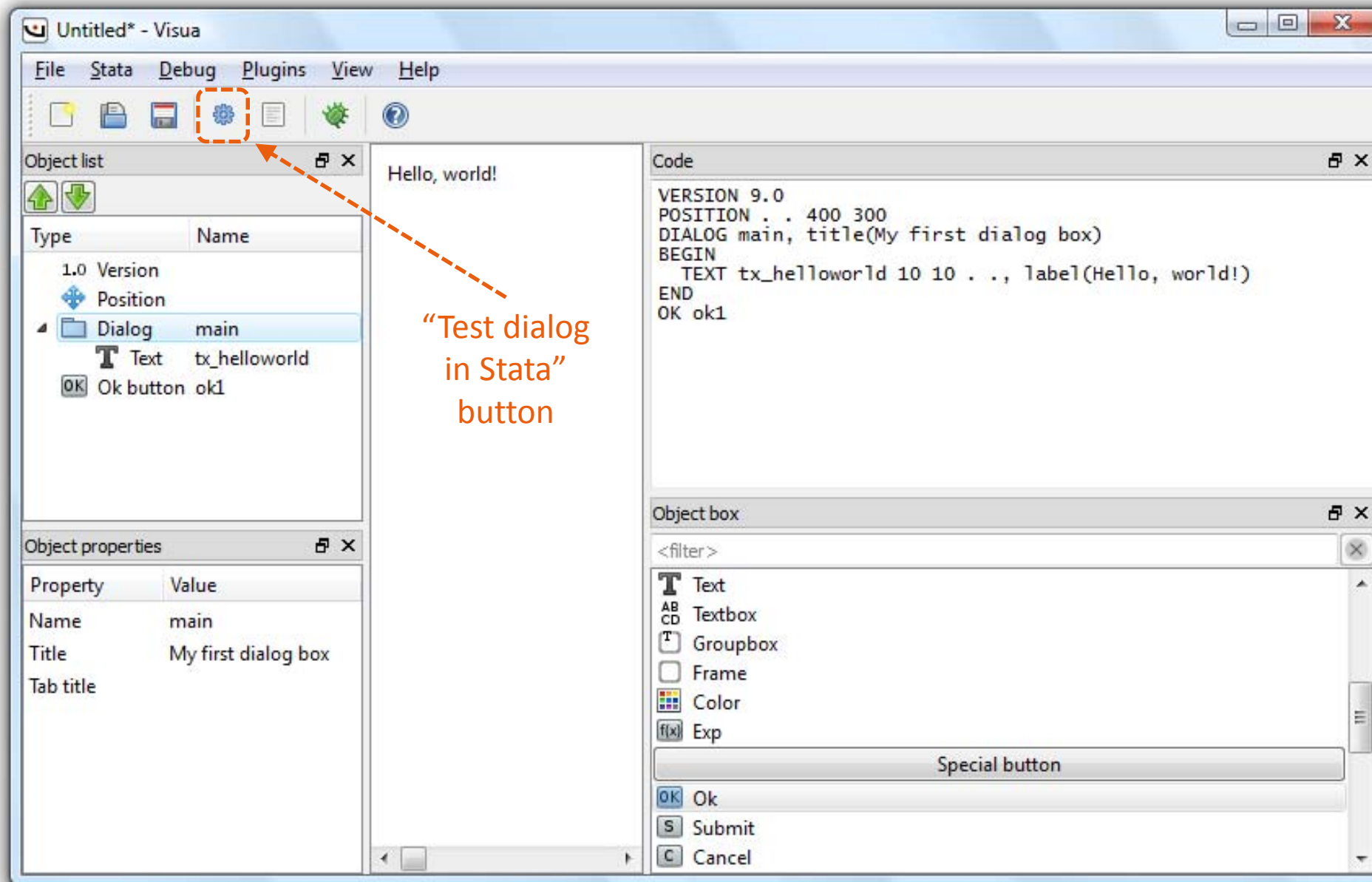
Select the “Text” object and modify its properties

The “Hello, world!” dialog box in Visua



Drag the “Ok” object from the object box and drop it into the object list

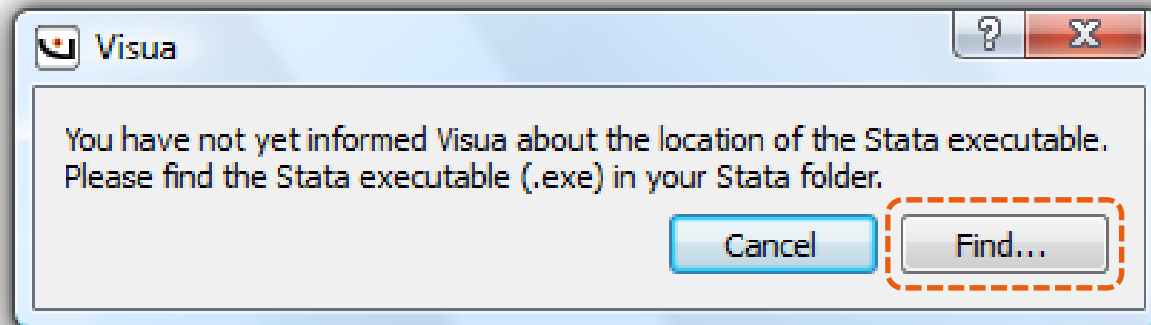
The “Hello, world!” dialog box in Visua



Click on the “Test dialog in Stata” button to test the dialog

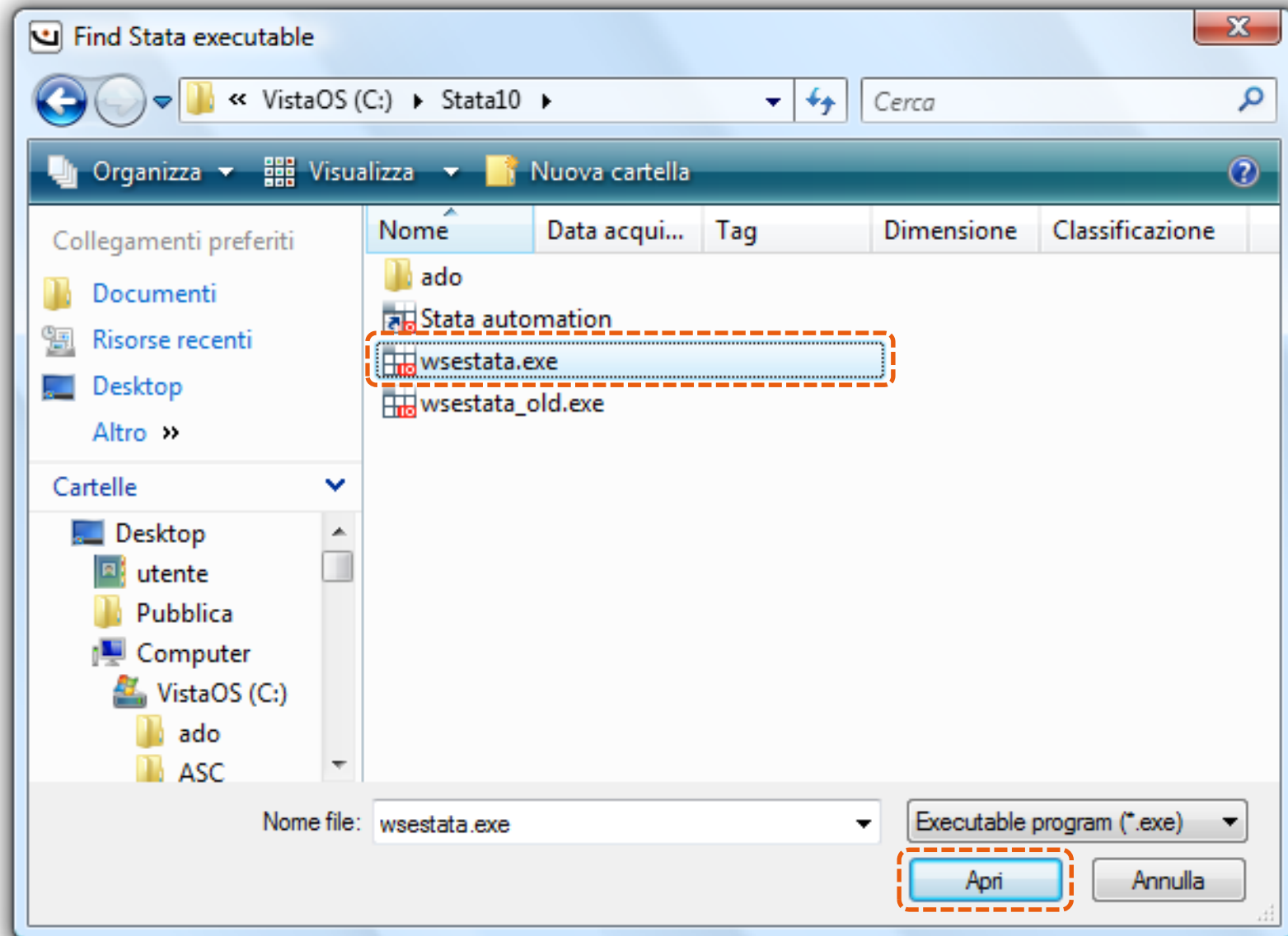
The “Hello, world!” dialog box in Visua

This message will only appear the first time you try testing the dialog in Stata



Click on the “Find...” button

The “Hello, world!” dialog box in Visua



Choose the Stata executable (“wsestata.exe” on my pc)

How the test process works

1) VISUA

- 1.1) Generates *visuatest.dlg*
- 1.2) Calls Stata to execute *visuatest.dlg*



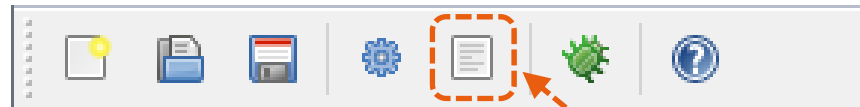
2) STATA[®]

- 2.1) Executes *visuatest.dlg*
- 2.2) Generates the log file *visuatest.log*

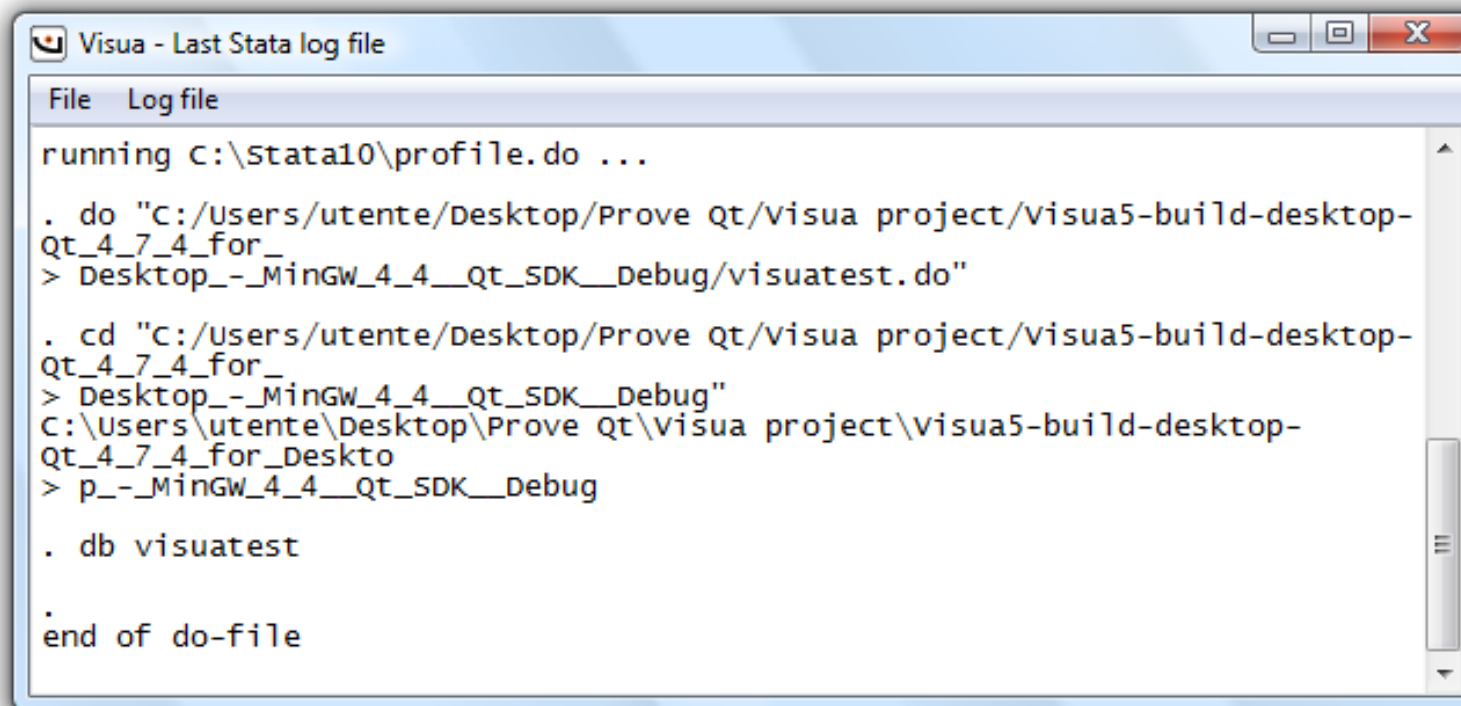
Note:

visuatest.dlg and *visuatest.log* are temporary files stored in the “Visua 0.1 beta\Visuatest” folder

Viewing the last Stata log file



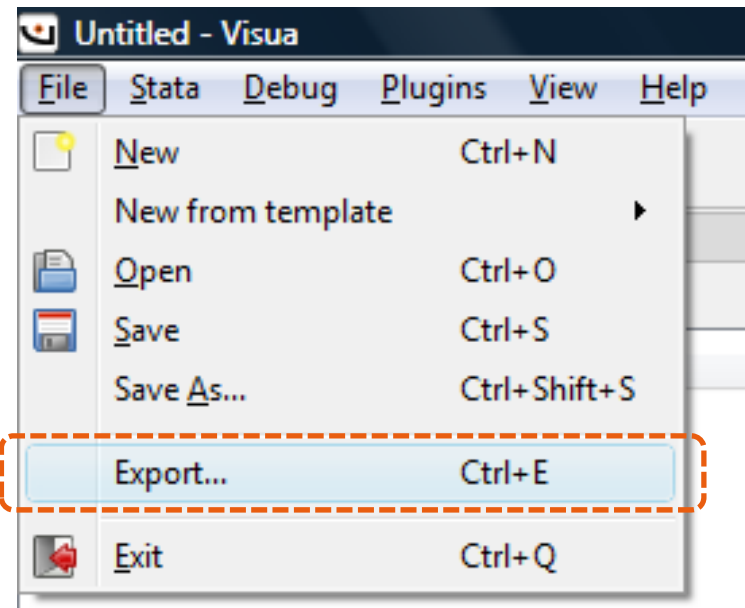
“View last Stata log file” button

A screenshot of a Stata window titled "Visua - Last Stata log file". The window displays the contents of the last Stata log file. The text in the window is as follows:

```
File  Log file
running C:\stata10\profile.do ...
. do "C:/Users/utente/Desktop/Prove Qt/Visua project/Visua5-build-desktop-Qt_4_7_4_for_
> Desktop_-_MingW_4_4__Qt_SDK__Debug/visuatest.do"
. cd "C:/Users/utente/Desktop/Prove Qt/Visua project/Visua5-build-desktop-Qt_4_7_4_for_
> Desktop_-_MingW_4_4__Qt_SDK__Debug"
C:\Users\utente\Desktop\Prove Qt\Visua project\Visua5-build-desktop-Qt_4_7_4_for_Deskto
> p_-_MingW_4_4__Qt_SDK__Debug
. db visuatest
.
end of do-file
```

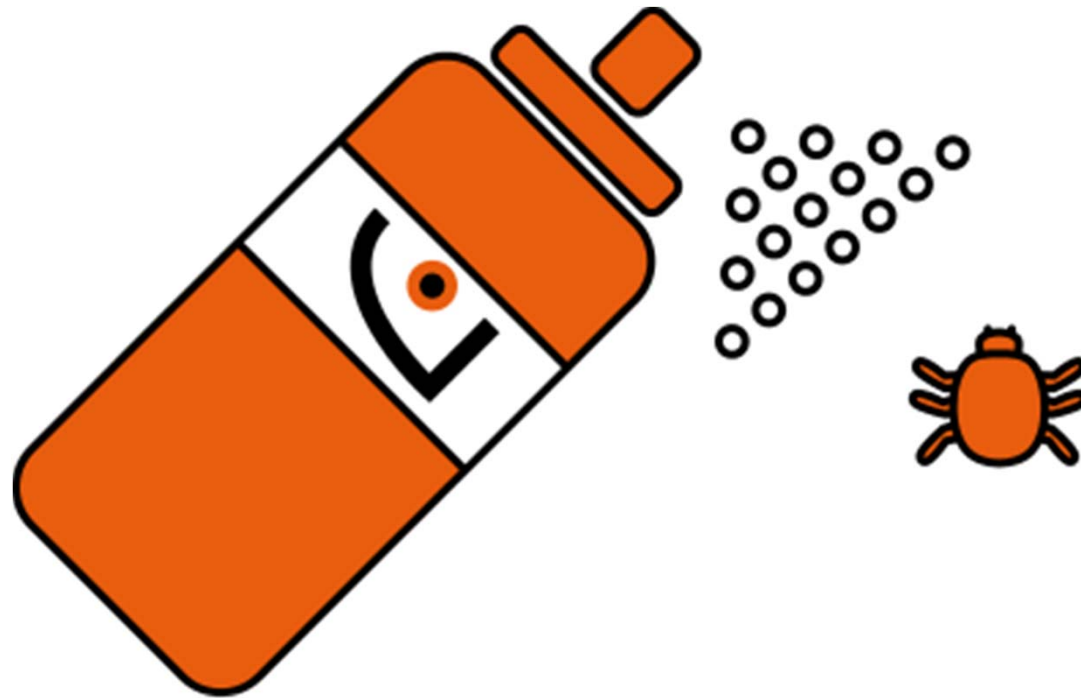
Click on the “View last Stata log file” button

Exporting to a .dlg file



“File” ⇔ “Export...”

Debugging



Debugging with Visua



"Debug report" button

Strengths

- User-friendly error messages
- Detection of multiple issues
- Warnings about non-critical issues

Weaknesses

Currently, only some errors are detected

Where is the error?

debugexample.dlg

```
VERSION 9.0
POSITION . . 400 100

LIST mylist
BEGIN
    mean
    range
END

DIALOG main, title(My dialog box)
BEGIN
    TEXT tx_choice 10 10 . ., label(Make your choice:)
    COMBOBOX tx_choice @ +20 200 100, dropdownlist contents(mylist) ///
        onselchangelist(action_list)
END

PROGRAM command
BEGIN
    put `display "Your main choice is " main.cb_choice `"'
END

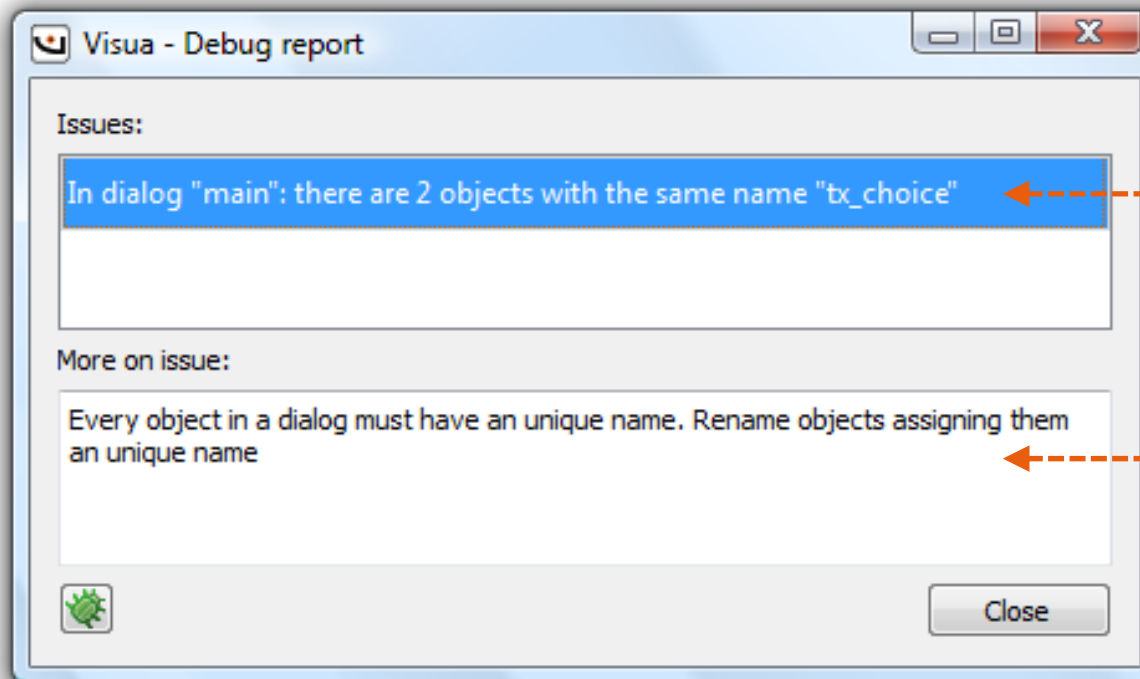
OK ok
SUBMIT submit
CANCEL cancel
```

Error messages from Stata and Visua



```
. discard  
  
. db debugexample  
class types are not the same  
r(4015);
```

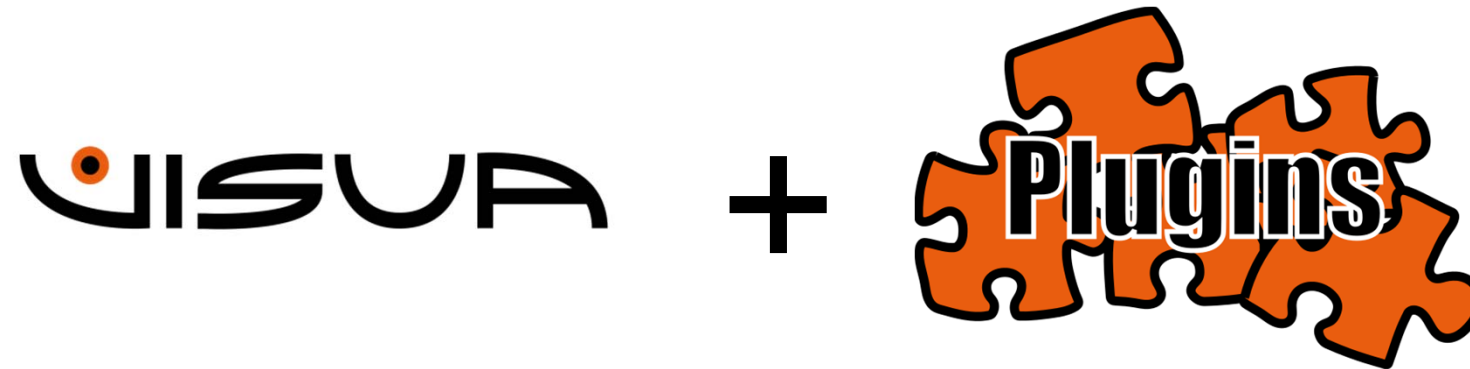
Obscure and unhelpful error message



More informative error message

Clear and user-friendly explanation about the issue

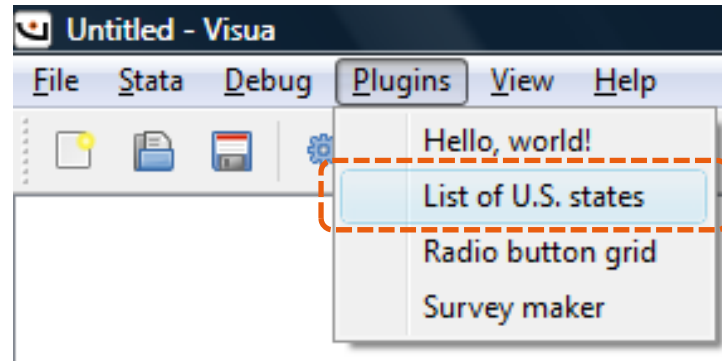
Plugins



The Visua plugin framework

- Plugins extend the capabilities of Visua
- They can save a lot of manually written code
- They are .dll files placed in the “plugins” folder
- The user can write plugins (in C++)

An example: "List of U.S. states" plugin

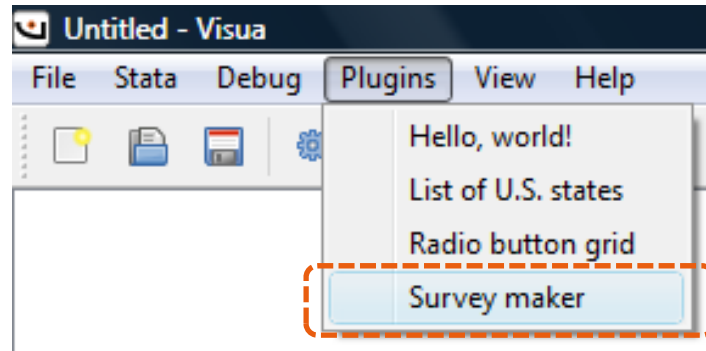


The generated code

```
LIST list_of_us_states
BEGIN
  Alabama
  Alaska
  Arizona
  .
  .
  .
  Wyoming
END
```

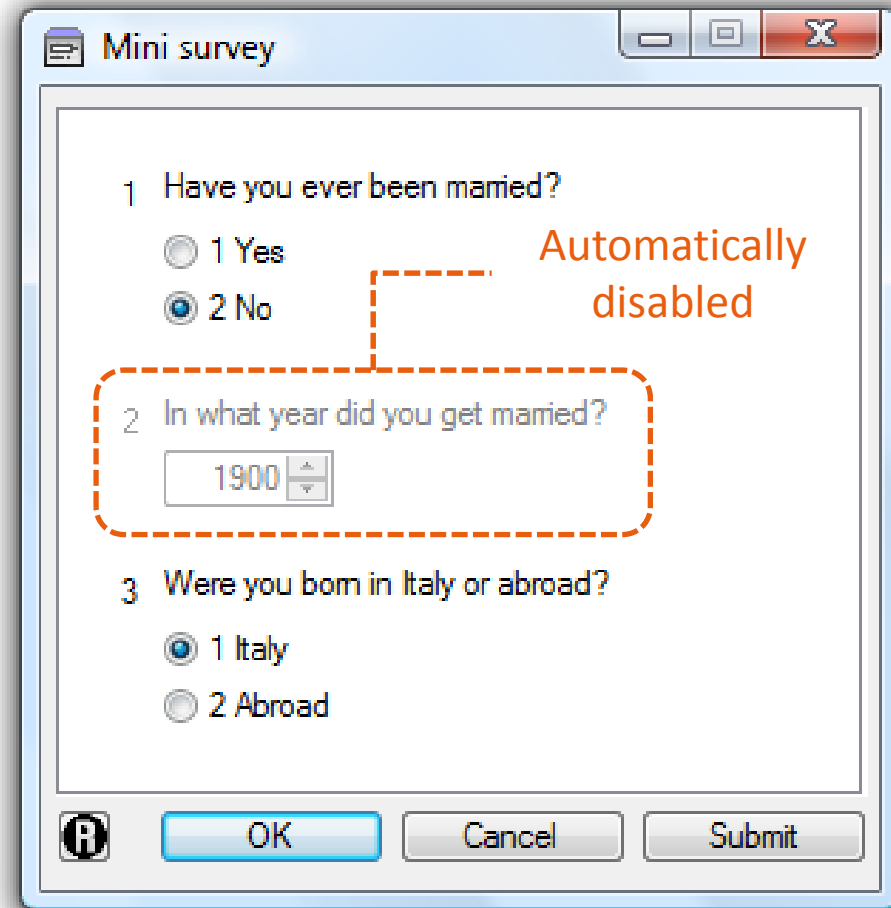
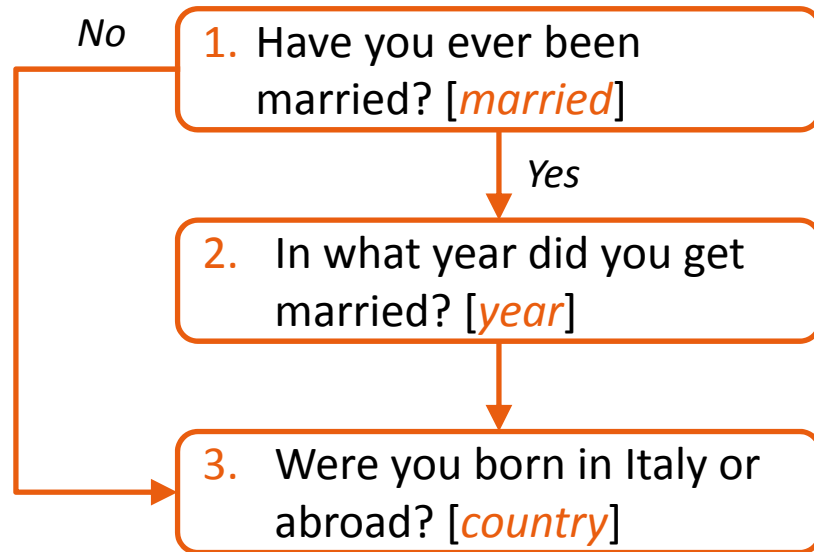
53 lines of code
were generated

The “Survey maker” plugin



- The “Survey maker” plugin creates a dialog box which allows the user to insert complex survey data directly into Stata
- Items are disabled, depending on the response from the previous questions
- Non-consistent data entries are avoided

The "Survey maker" plugin: a filter question

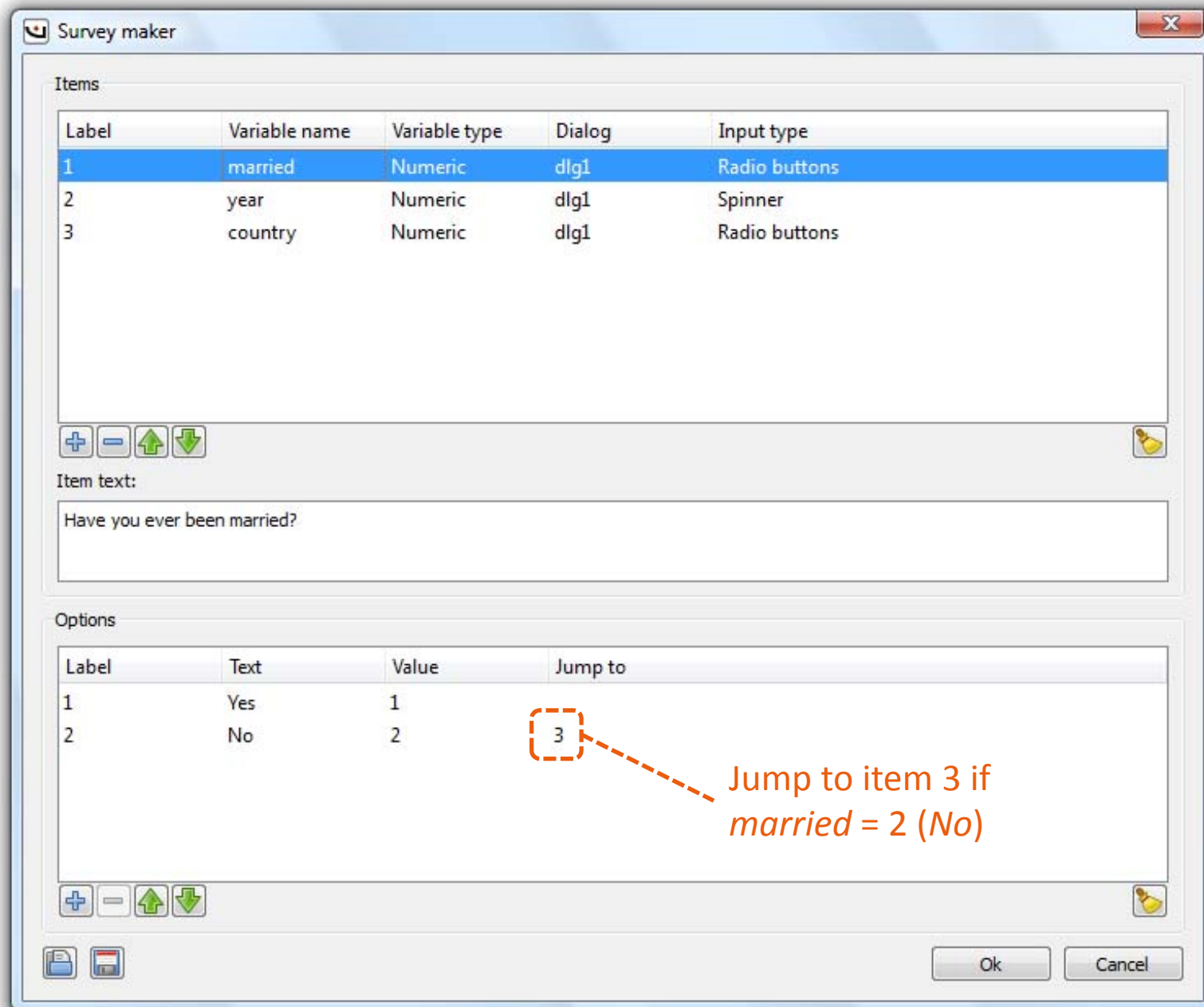


| | married | year | country |
|----|---------|-------------|---------|
| 1. | 1 | 1996 | 1 |
| 2. | 2 | <u>2005</u> | 1 |

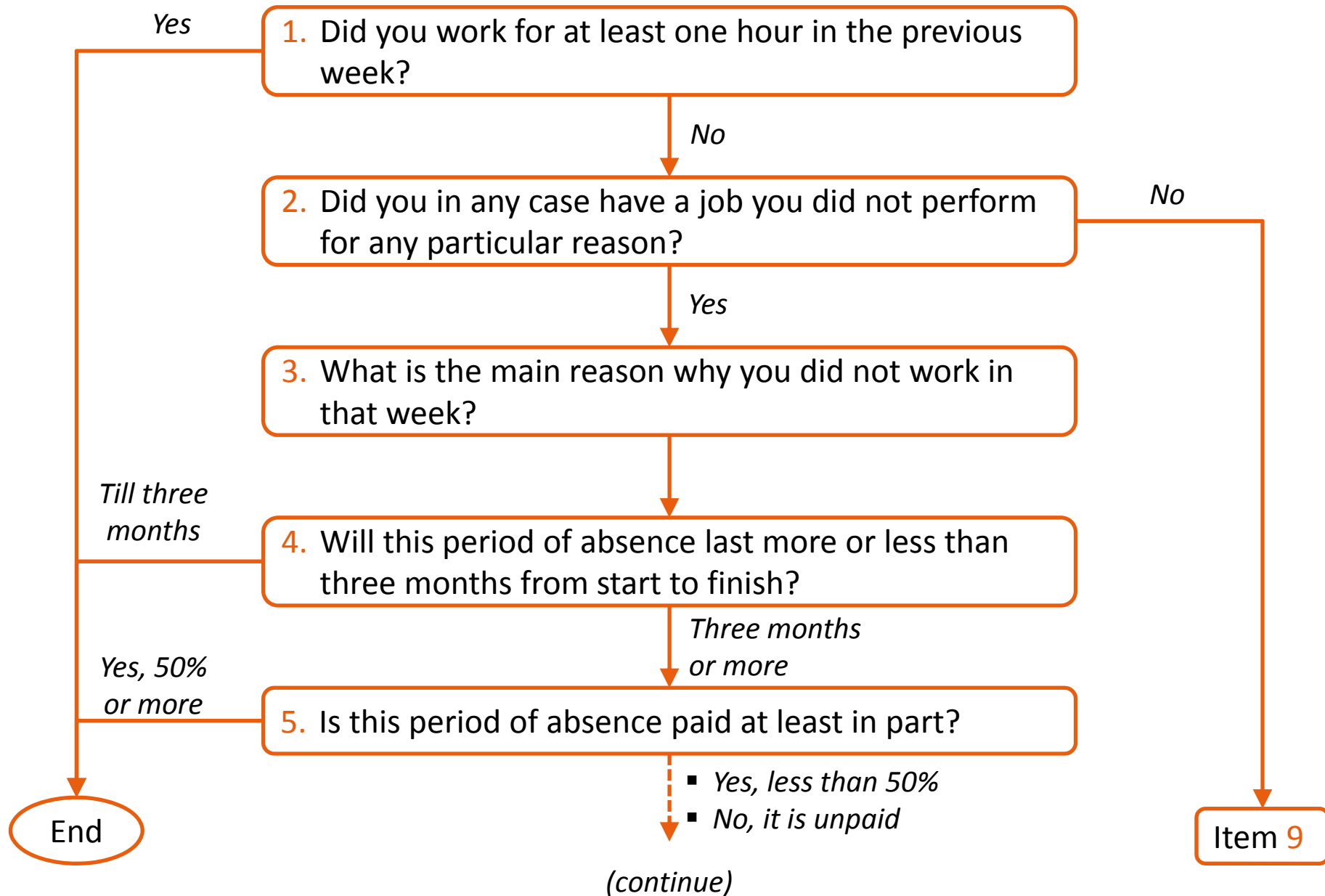
Consistent record

Non-consistent record:
the dialog will avoid this

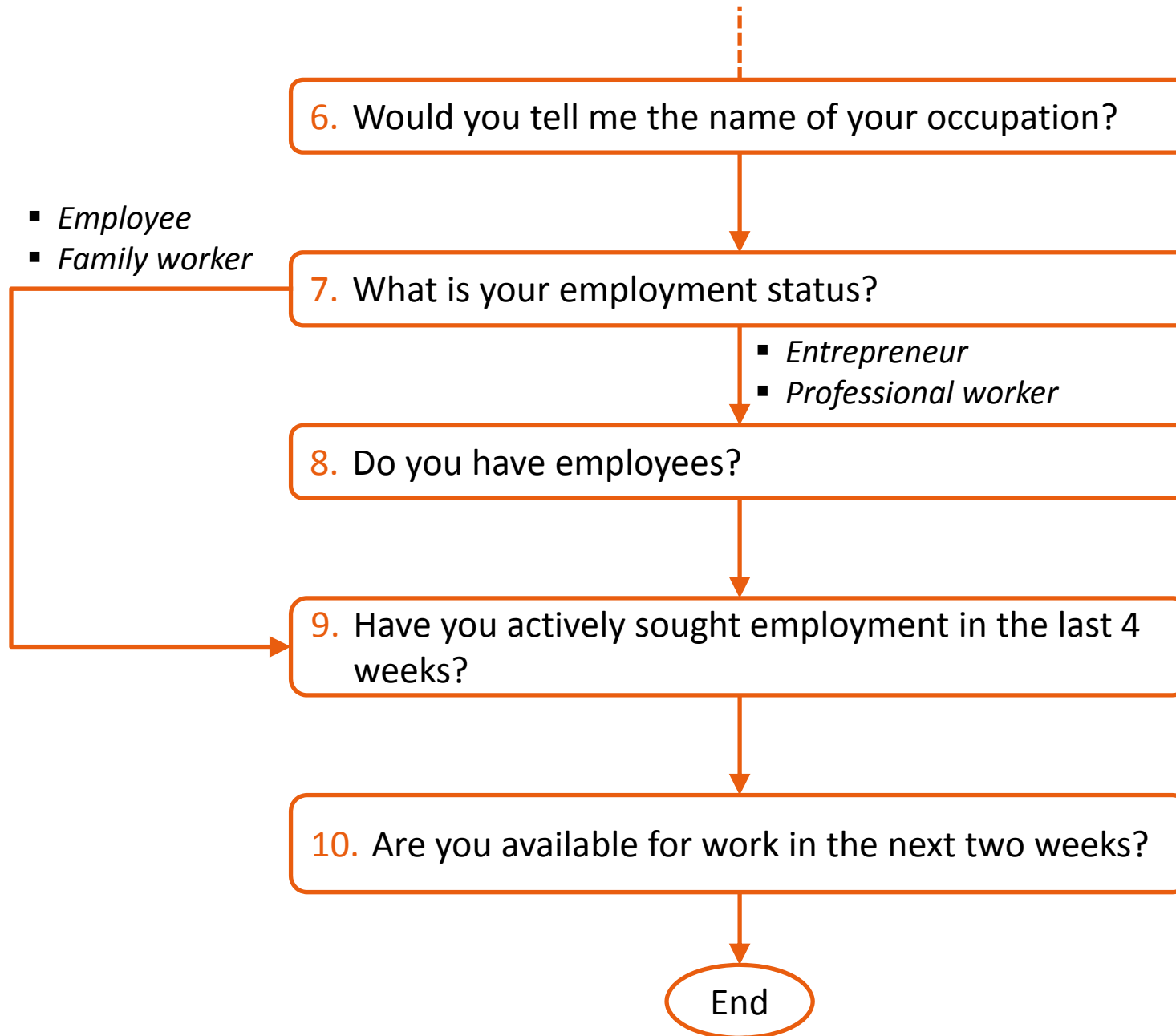
The Survey Maker plugin in action



A simplified labour force survey



A simplified labour force survey



A simplified labour force survey

Survey maker

Items

| Label | Variable name | Variable type | Dialog | Input type |
|-------|---------------|---------------|--------|---------------|
| 1 | work | Numeric | dlg1 | Radio buttons |
| 2 | workanyway | Numeric | dlg1 | Radio buttons |
| 3 | reasonnotwork | Numeric | dlg1 | Radio buttons |
| 4 | absenceperiod | Numeric | dlg2 | Radio buttons |
| 5 | absencepay | Numeric | dlg2 | Radio buttons |
| 6 | occupation | String | dlg2 | Line edit |
| 7 | status | Numeric | dlg3 | Radio buttons |
| 8 | hasemployees | Numeric | dlg3 | Radio buttons |

+ - ↑ ↓

Item text:

Did you work at least one hour in the previous week?

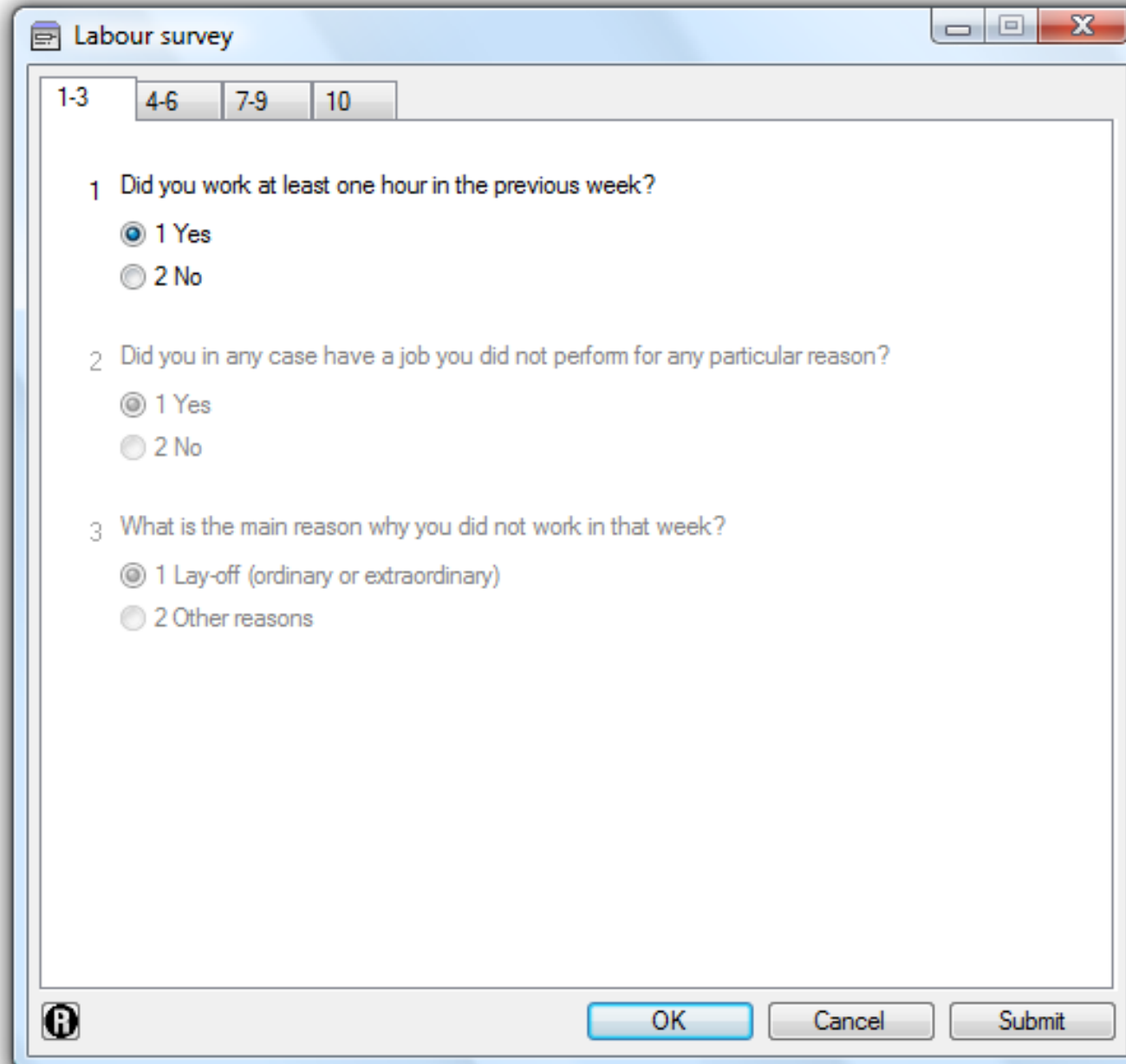
Options

| Label | Text | Value | Jump to |
|-------|------|-------|---------|
| 1 | Yes | 1 | end |
| 2 | No | 2 | |

+ - ↑ ↓

Ok Cancel

A simplified labour force survey



Labour survey

1-3 4-6 7-9 10

1 Did you work at least one hour in the previous week?

1 Yes

2 No

2 Did you in any case have a job you did not perform for any particular reason?


1 Yes

2 No

3 What is the main reason why you did not work in that week?

1 Lay-off (ordinary or extraordinary)

2 Other reasons

 OK Cancel Submit

A simplified labour force survey

Generated code

412 lines of code were automatically generated!

Check before data insertion

Before inserting data into the dataset, the dialog box checks if:

- the variables exist
- the variables are of the expected type

Tip

Add a missing value option to each item if you want to allow missing value data

A simplified labour force survey (missing values are allowed)

The screenshot shows a window titled "Survey" with a tabbed interface. The first tab, labeled "1-3", is active. It contains three questions, each with radio button options. The "0 Missing" option for each question is highlighted with a red dashed box.

1-3 4-6 7-9 10

1 Did you work at least one hour in the previous week?
 0 Missing
 1 Yes
 2 No

2 Did you in any case have a job you did not perform for any particular reason?
 0 Missing
 1 Yes
 2 No

3 What is the main reason why you did not work in that week?
 0 Missing
 1 Lay-off (ordinary or extraordinary)
 2 Other reasons

© OK Cancel Submit

Why should you use Visua?

- Speed-up the code writing process
- Avoid numerous syntax errors
- Easy development environment
- What you see is what you get
- Great power with plugins

— *Thank you for your attention* —

VISUA



Appendix A – How to write Visua plugins



What do you need to write Visua plugins?

- Proficiency in the use of the C++ programming language and the Qt 4 programming framework
- The Qt 4.x SDK (software development kit) (<http://qt.nokia.com>)
- A reference to the Qt Plugin Framework:
Blanchette J., Summerfield M. (2006), *C++ GUI Programming with Qt 4*, Prentice Hall.
- The *visuaplugininterface.h* file (see next slide)

The Visua plugin interface file

visuaplugininterface.h

```
#ifndef VISUAPLUGININTERFACE_H
#define VISUAPLUGININTERFACE_H

#include <QtGui>

class VisuaPluginInterface
{
public:
enum Behaviour {
    CreateNewVisuaDocument,
    AppendAlways,
    AppendToDialogOnly,
    AppendOutsideDialogOnly};
virtual ~VisuaPluginInterface() {}
virtual QString visuaCode() = 0;
virtual QString pluginName() = 0;
virtual int dialogExec(QWidget *parent) = 0;
virtual bool isDialog() = 0;
virtual VisuaPluginInterface::Behaviour behaviour() = 0;
};

Q_DECLARE_INTERFACE(VisuaPluginInterface, "Visua.VisuaPluginInterface/1.0")

#endif // VISUAPLUGININTERFACE_H
```

Example: let's create the "Hello, world!" plugin

The files

- helloworld.h
- helloworld.cpp
- helloworld.pro

The Visua code output generated by the plugin

```
<visua version="0.1">
  <object type="text">
    <name>hello_world_text</name>
    <x>20</x>
    <y>20</y>
    <xsize>100</xsize>
    <ysize>.</ysize>
    <label>Hello, world!</label>
  </object>
</visua>
```



How it will be "translated" by Visua

```
TEXT hello_world 20 20 100 ., label(Hello, world!)
```

Example: the “Hello, world!” plugin – header file

helloworld.h

```
#ifndef HELLOWORLD_H
#define HELLOWORLD_H

#include <QtGui>
#include "visuapugininterface.h"

class HelloWorld : public QObject, public VisuaPluginInterface
{
    Q_OBJECT
    Q_INTERFACES(VisuaPluginInterface)

public:
    QString visuaCode();
    QString pluginName();
    int dialogExec(QWidget *parent);
    bool isDialog();
    VisuaPluginInterface::Behaviour behaviour();
};

#endif // HELLOWORLD_H
```


Example: the “Hello, world!” plugin – implementation file

helloworld.cpp (part 1 of 2)

```
#include "helloworld.h"

QString HelloWorld::visuaCode()
{
    QString code;
    code += "<visua version=\"0.1\">";
    code += "<object type=\"text\">\n";
    code += "<name>hello_world_text</name>\n";
    code += "<x>20</x>\n";
    code += "<y>20</y>\n";
    code += "<xsize>100</xsize>\n";
    code += "<ysize>.</ysize>\n";
    code += "<label>Hello, world!</label>\n";
    code += "</object>\n";
    code += "</visua>";
    return code;
}

QString HelloWorld::pluginName()
{
    return "Hello, world!";
}
```

(continue)

Example: the “Hello, world!” plugin – implementation file

helloworld.cpp (part 2 of 2)

(continue)

```
int HelloWorld::dialogExec(QWidget *parent)
{
    return 0;
}

bool HelloWorld::isDialog()
{
    return false;
}

VisuaPluginInterface::Behaviour HelloWorld::behaviour()
{
    return VisuaPluginInterface::AppendAlways;
}

Q_EXPORT_PLUGIN2(helloworld, HelloWorld)
```

Example: the “Hello, world!” plugin – Qt project file

helloworld.pro

```
TEMPLATE = lib
CONFIG += plugin

HEADERS += helloworld.h

SOURCES += helloworld.cpp
```

Example: the “Hello, world!” plugin – compilation and use

Compilation

The build process will end with a “helloworld.dll” file

Use

- 1) Put the “helloworld.dll” into the “plugins” folder under the Visua program folder
- 2) Restart Visua
- 3) The “Hello, world!” plugin will appear under the “Plugins” menu

The functions of the Visua plugin programming framework

virtual QString VisuaPluginInterface::visuaCode() = 0

Returns the Visua code. The string must begin with the `<visua version="0.1">` tag and end with the `</visua>` tag.

virtual QString VisuaPluginInterface::pluginName() = 0

Returns the name of the plugin. It's the name which will appear on the "Plugins" menu in Visua.

virtual QDialog::DialogCode VisuaPluginInterface::dialogExec(QWidget *parent) = 0

This function is automatically called by Visua if the plugin has a dialog window. The dialog is always modal. The function returns a `QDialog::DialogCode` code, which can be `QDialog::Accepted` or `QDialog::Rejected` and it should be associated with the user final action with the dialog window. If the return value is `QDialog::Rejected`, the plugin has no effect on the Visua document.

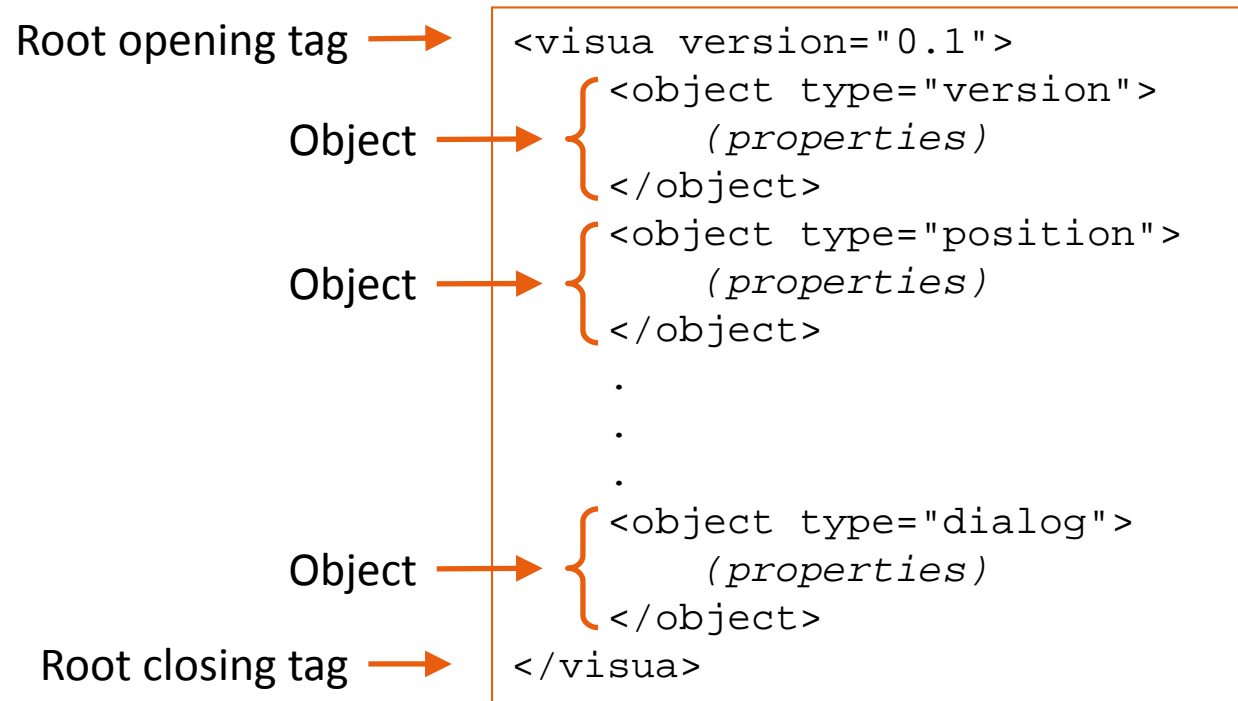
virtual bool VisuaPluginInterface::isDialog() = 0

The return value of this function must be set to "true" if the plugin has a dialog that will be executed when the plugin is called. Alternatively, the return value must be set to zero.

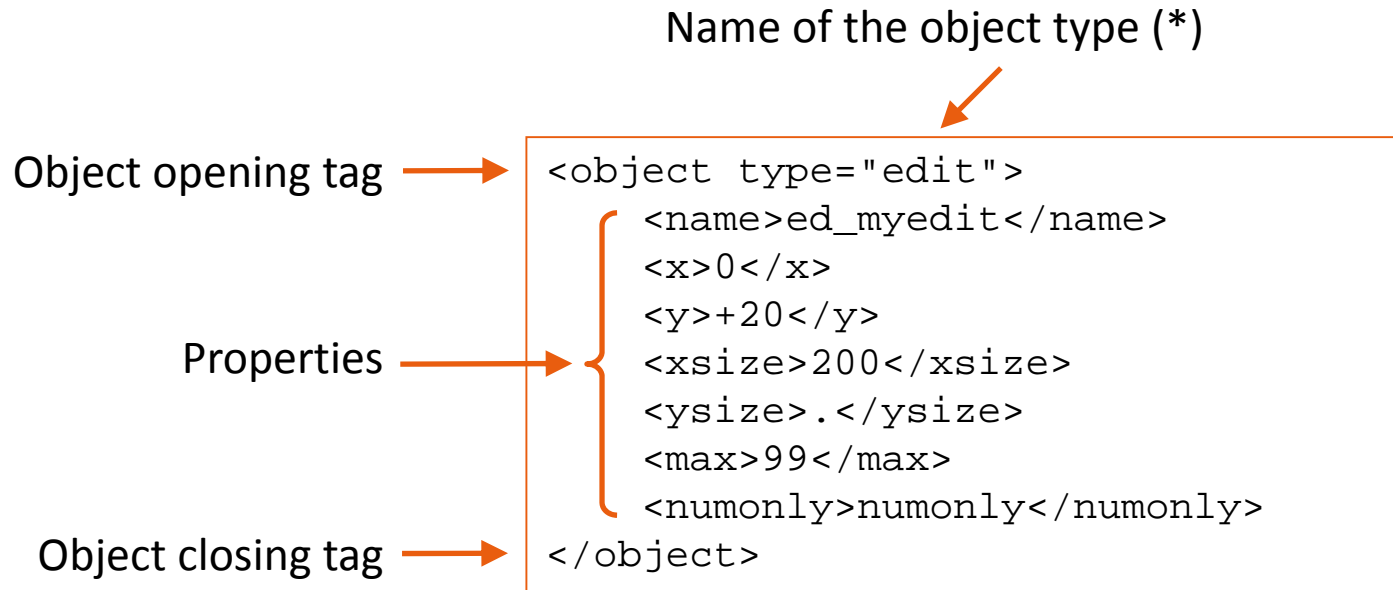
virtual VisuaPluginInterface::Behaviour behaviour() = 0

The return value must be one of the following: `Behaviour::CreateNewVisuaDocument`, `Behaviour::AppendAlways`, `Behaviour::AppendToDialogOnly`, `Behaviour::AppendOutsideDialogOnly`. The return value controls the plugin behaviour i.e. where the Visua code can be appended and if the current document will be replaced after the execution of the plugin.

How to write the Visua code: an initial glance

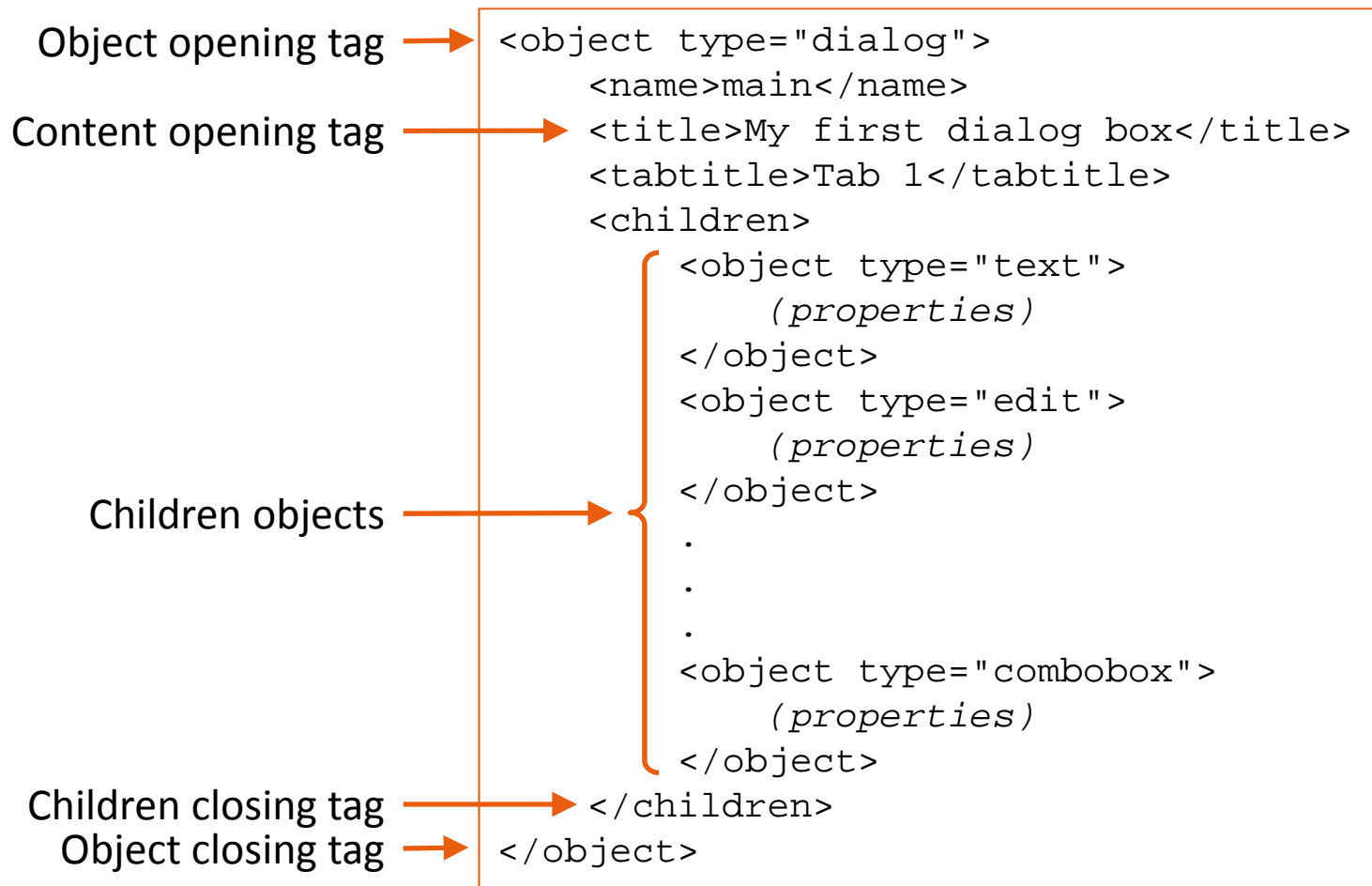


An example of an EDIT object



(*) It's the name of the control in all lower-case letters. For example, use "combobox" for the COMBOBOX object

Special object: DIALOG



Special object: LIST

Object opening tag → `<object type="list">`
Content opening tag → `<content>`
Items → `<listitem>item_1</listitem>`
`<listitem>item_1</listitem>`
`.`
`.`
`.`
`<listitem>item_n</listitem>`
Content closing tag → `</content>`
Object closing tag → `</object>`

Special object: PROGRAM

Object opening tag → `<object type="program">`
Code opening tag → `<code>`
Program lines → `<codeline>put "mean " main.ed_1</codeline>`
`<codeline>put "mean " main.ed_2</codeline>`
`.`
`.`
`.`
`<codeline>put "mean " main.ed_n</codeline>`
Code closing tag → `</code>`
Object closing tag → `</object>`

Example: the Visua code for the "Hello, world!" dialog (helloworld.vis)

```
<visua version="0.1">
  <object type="version">
    <versionnumber>9.0</versionnumber>
  </object>
  <object type="position">
    <x>.</x>
    <y>.</y>
    <xsize>360</xsize>
    <ysize>40</ysize>
  </object>
  <object type="dialog">
    <name>main</name>
    <title>My first dialog box</title>
    <children>
      <object type="text">
        <name>tx_helloworld</name>
        <x>0</x>
        <y>0</y>
        <xsize>.</xsize>
        <ysize>.</ysize>
        <label>Hello, world!</label>
      </object>
    </children>
  </object>
  <object type="ok">
    <name>ok</name>
  </object>
</visua>
```

List of objects supported in the Visua plugin programming framework

- VERSION
- INCLUDE
- DEFINE
- POSITION
- LIST
- DIALOG
- CHECKBOX
- RADIO
- SPINNER
- EDIT
- VARLIST
- VARNAME
- FILE
- LISTBOX
- COMBOBOX
- TEXT
- TEXTBOX
- GROUPBOX
- FRAME
- COLOR
- EXP
- OK
- SUBMIT
- CANCEL
- COPY
- HELP
- RESET
- SCRIPT
- PROGRAM

How to learn more on the Visua code tags?

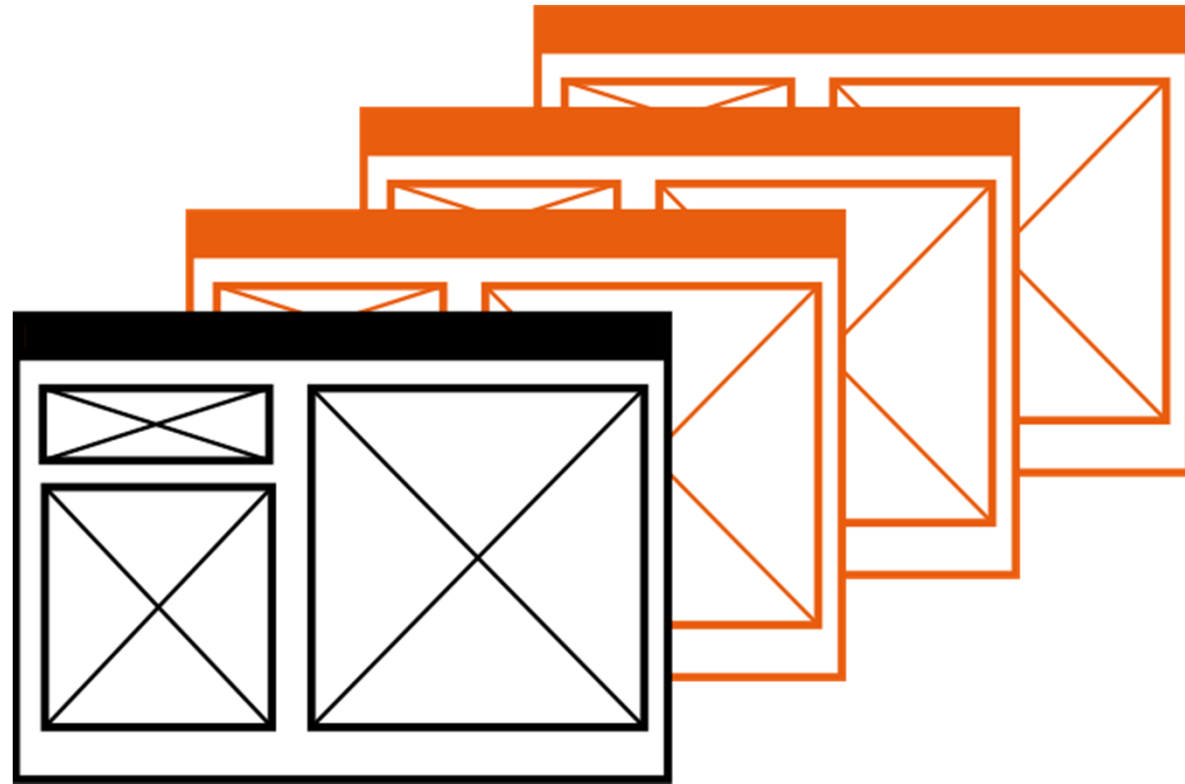
Sorry, there is no complete official documentation

You can learn more by looking at the `.vis` files you can generate using Visua. You can open them with a plain text editor (for example Windows Notepad)

Warning

The tags may change in future version of Visua

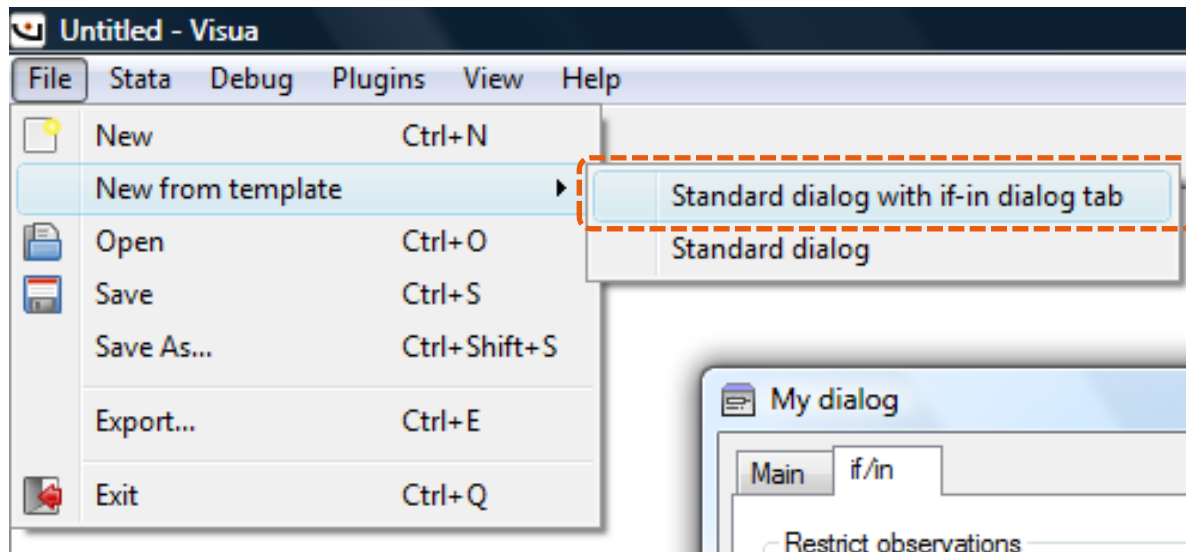
Appendix B – Visua templates



What are templates?

- A template is a model you can use as a starting point to develop your own dialog
- Templates are accessible from “File” ⇒ “New from template”
- They are .vis files in the “templates” folder
- You can add new templates to the “templates” folder (restart Visua to load them)

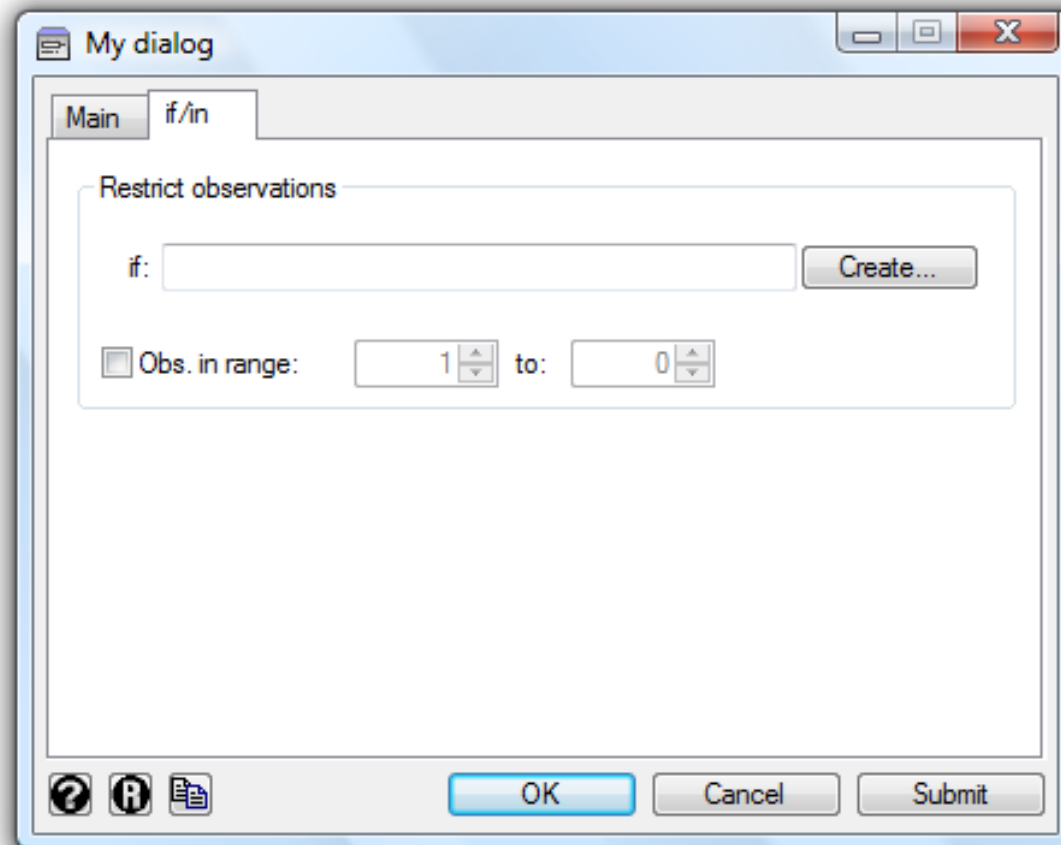
The “Standard dialog with if-in dialog tab” template



Start with a dialog
with a “if/in” tab



Save time



VISUA