

# iTcl and TclOO

From the perspective of a simple user

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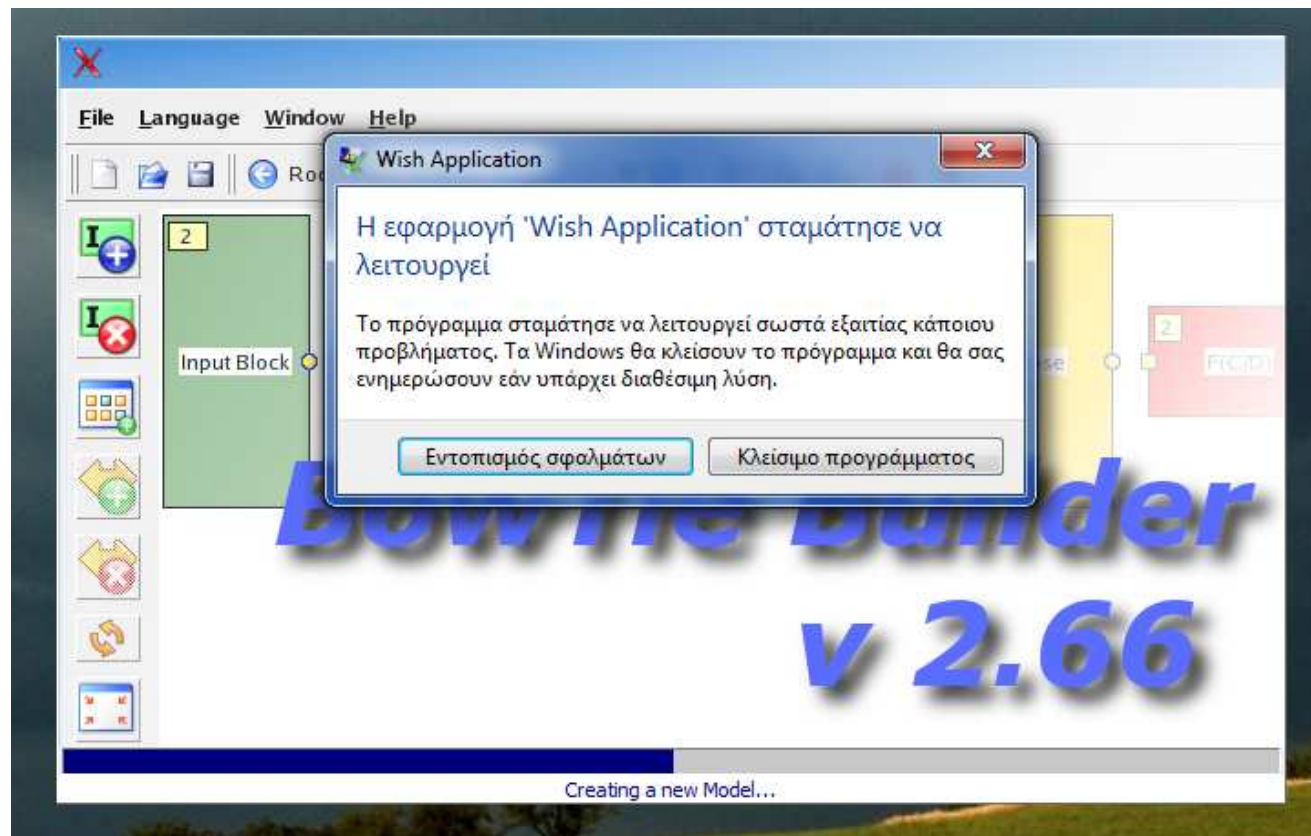
# Overview

- The shock of Tcl 8.6
- Porting existing code to TclOO
- Case study: the Ellogon NLP platform
- iTcl facilities in TclOO
- Organisation of classes in Ellogon
- Creating an Annotation Tool
- Concatenating Dialogs
- Conclusions



## iTcl and Tcl 8.6

- Assume an application that uses Itcl
  - What happens if it is run under ActiveTcl 8.6 beta?





# iTcl and Tcl 8.6

- Ok, t
- Le
- Tc

```
Κουσόλα
File Edit Help
can't read "objectsTree": no such variable
can't read "objectsTree": no such variable
while executing
"$objectsTree configure -dropenabled 1 -dragenabled 1 -dropcmd "$this CreatePro
pertiesPage_Objects_DropEvent""
(object "::MainWindow::_treeGraphObj" method "::GraphTreeWidget::CreateProp
ertiesPage_Objects" body line 3)
invoked from within
"CreatePropertiesPage_Objects"
(object "::MainWindow::_treeGraphObj" method "::GraphWidget::CreateObjectWi
dget" body line 103)
invoked from within
"CreateObjectWidget"
while constructing object "::MainWindow::_treeGraphObj" in ::GraphWidget::c
onstructor (body line 17)
invoked from within
"chain $parent_block $parent_widget $lvl 0"
while constructing object "::MainWindow::_treeGraphObj" in ::GraphTreeWidge
t::constructor (body line 2)
invoked from within
"GraphTreeWidget $tgraph [${frame}_graphObj name] [string trimright $twin .].ma
in 0"
(procedure "::MainWindow::New" line 64)
invoked from within
"::MainWindow::New"
(Editor) 1 % |
```

10)  
4)



## iTcl and Tcl 8.6

- Ok, iTcl 4.0 has a problem with a variable
  - Lets “correct” this

```
Κονσόλα
File Edit Help
can't read "@itcl ::MainWindow::_level.main_graphObj->ib_block1 type": no such variable
can't read "@itcl ::MainWindow::_level.main_graphObj->ib_block1 type": no such variable
while executing
"set "@itcl $linkedObject $var""
  (object "::MainWindow::_treeGraphObj->ib_block1" method "::BlockItem::CommunicateLinkedObject" body line 20)
  invoked from within
"CommunicateLinkedObject"
  (object "::MainWindow::_treeGraphObj->ib_block1" method "::BlockItem::LinkToObject" body line 4)
  invoked from within
"$blk LinkToObject $block"
  (object "::MainWindow::_treeGraphObj" method "::GraphTreeWidget::SynchroniseBlocks" body line 122)
  invoked from within
"SynchroniseBlocks $parentGraph"
  (object "::MainWindow::_treeGraphObj" method "::GraphTreeWidget::Draw" body line 3)
  invoked from within
"$tgraph Draw"
  (procedure "::MainWindow::New" line 65)
  invoked from within
 "::MainWindow::New"
(Editor) 1 %
```



## iTcl and Tcl 8.6

- iTcl object variables not supported?
  - It seems no...
    - ✓ but, object naming was internal
- iTcl 4.0 has been actively maintained!
  - Significant progress since last test (6-8 months ago)
  - Does not crash
  - A few “rough edges” remain
- But:
  - Support for iTcl object variables seems missing
- Status of iTcl next generation?
  - Unknown. Not working either in previous tests



## iTcl and Tcl 8.6

### Alternatives for running the application?

- Wait until iTcl 4.0 is ready
  - Will it support 3.4 object variable naming?
- Port the code from iTcl to TclOO
  - Hm, 41 classes? ~20.000 lines of code?
    - ✓ Such a task needs to be automated
- Stick to Tcl 8.5 and iTcl 3.4
- But what happens with open source applications?



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## Porting from iTcl to TclOO (1)

- A medium sized application: **Ellogon**
  - Open source (LGPL), <http://www.ellogon.org>
  - Sticking to Tcl 8.5 is not an option
  - But ~**480** iTcl classes need to be ported!
    - ✓ Different “variable” syntax
    - ✓ The “my” keyword when calling methods
    - ✓ Different method exporting convention
    - ✓ ...
    - ✓ Where is TclOO documentation?



## Porting from iTcl to TclOO (2)

- Largely a manual (and time consuming) effort
  - A helper Tcl script to perform “easy” substitutions
  - Several months were needed
  - But, a few portions could not be ported
    - ✓TclOO has some limitations
      - Or do I have a bad programming style? ☺
- The task is now largely finished
  - And the helper Tcl script got quite complex
- And what about other applications?
  - How about turning the conversion script into an iTcl emulator?



# Porting from iTcl to TclOO (3)

The image displays two overlapping windows of the BowTie Builder software. The top window, titled "BowTie Builder (Level Graph Layout)...", shows a diagram with five main components: an "Input Block" (green rectangle), a "Prevention" block (red triangle), a "C.E." (Central Element, yellow circle), a "Mitigation" block (red inverted triangle), and a "Dose" block (yellow rectangle). The bottom window, titled "BowTie Builder (Stacked Box Layout)...", shows the same diagram in a different layout where the components are stacked vertically. Both windows feature a menu bar (File, Questions, Tools, Window, Help), a toolbar with various icons, and a right-hand pane with a tree view of objects. The tree view in the top window lists "Objects", "Input Block", and "Prevention". The tree view in the bottom window lists "Objects", "Input Block", "Prevention", "C.E.", "Mitigation", "Dose", "F(C/D)", "Consequences", and "Connectors". The status bar at the bottom of the bottom window shows "Unmodified" and "cp1253".



## Porting from iTcl to TclOO (4)

- A quick and simple approach actually
- Test application executes further than latest iTcl 4.0
- iTcl 3.x object variable references (“@itcl ...”) are converted to TclOO equivalent

### But:

- Not all code substitutions are performed
  - Adding the “my” keyword to existing code is tricky
  - 4 regular expressions are not enough to handle this
    - ✓ A package that “parses” Tcl is not available
  - Finally I gave up
    - ✓ no regular expressions for some cases



## Porting: Differences (1)

Most notable differences between the two extensions:

- No configure/cget on TclOO objects
- No common variables across objects of the same class in TclOO
- No “static” class methods (methods that do not require an object to be called) in TclOO
- Different semantics for variables
- A specific method in the classes hierarchy of an object cannot be called in TclOO
- TclOO requires the keyword “my” while calling methods from inside of an object



## Porting: Differences (2)

Most notable differences between the two extensions:

- TclOO automatically exports methods that start with a lowercase letter
- No facility for “local” to procedures objects (like `itcl::local`) in TclOO



# Porting: Similarities

iTcl	TclOO
method	my method
\$this	[self]
chain	next
itcl::scope	my varname
inherit	superclass
itcl::body	oo::define body

## Interesting features of TclOO

- Everything subclasses `oo::object`
- “mixin”s
- “unknown” on objects
- The “my” keyword



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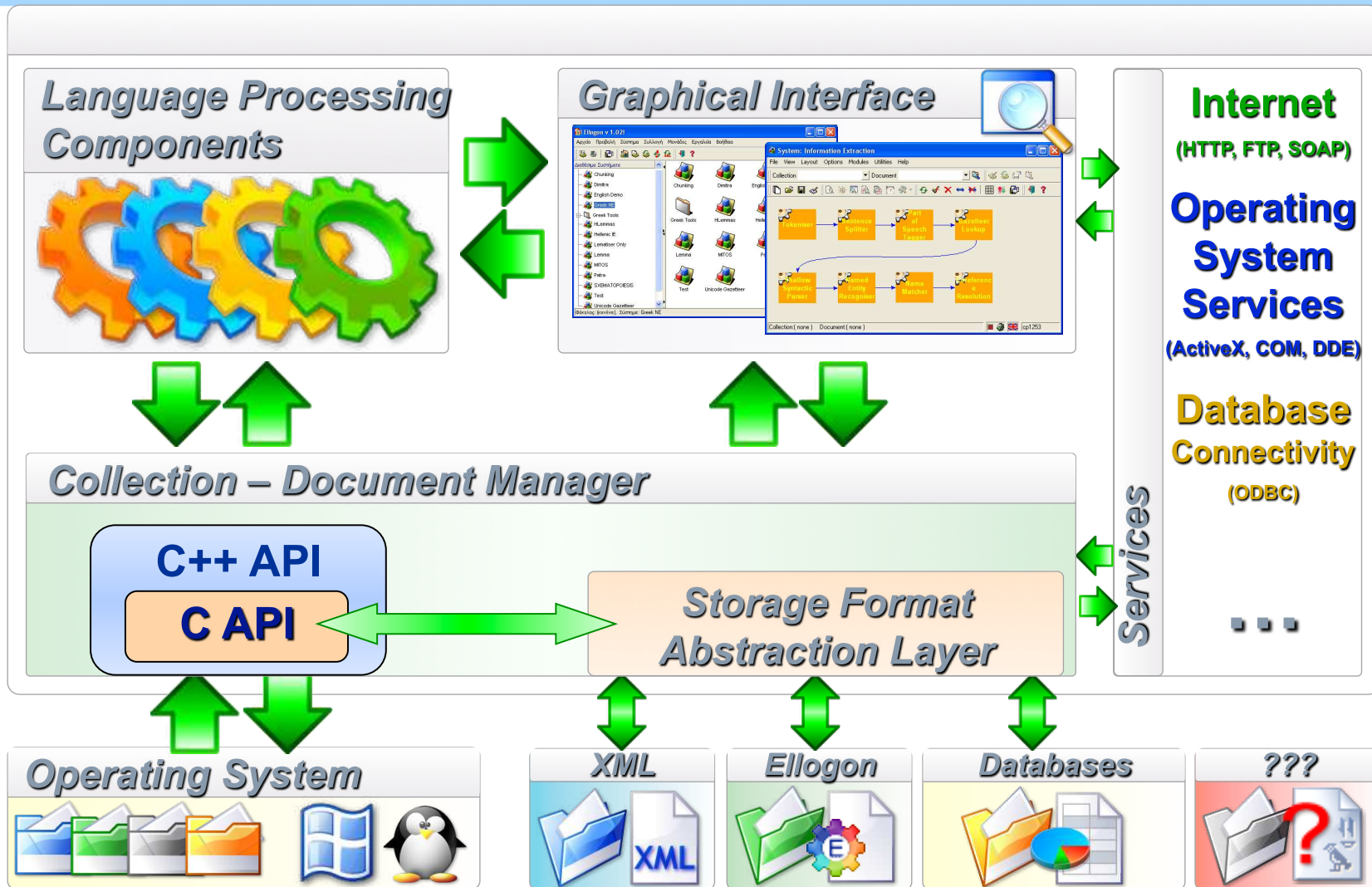


## Case study: the Ellogon NLP platform

- Ellogon is an infrastructure for natural language processing
  - Provides facilities for managing corpora
  - Provides facilities for manually annotating corpora
  - Provides facilities for loading processing components, and apply them on corpora
- Development started in 1998
  - I think with Tcl/Tk 8.1
  - ~500.000 lines of C/C++/Tcl code
  - A lot of legacy code, especially in the GUI
    - ✓ No widespread use of tile/ttk
    - ✓ No OO (i.e. iTcl) in most parts of the code

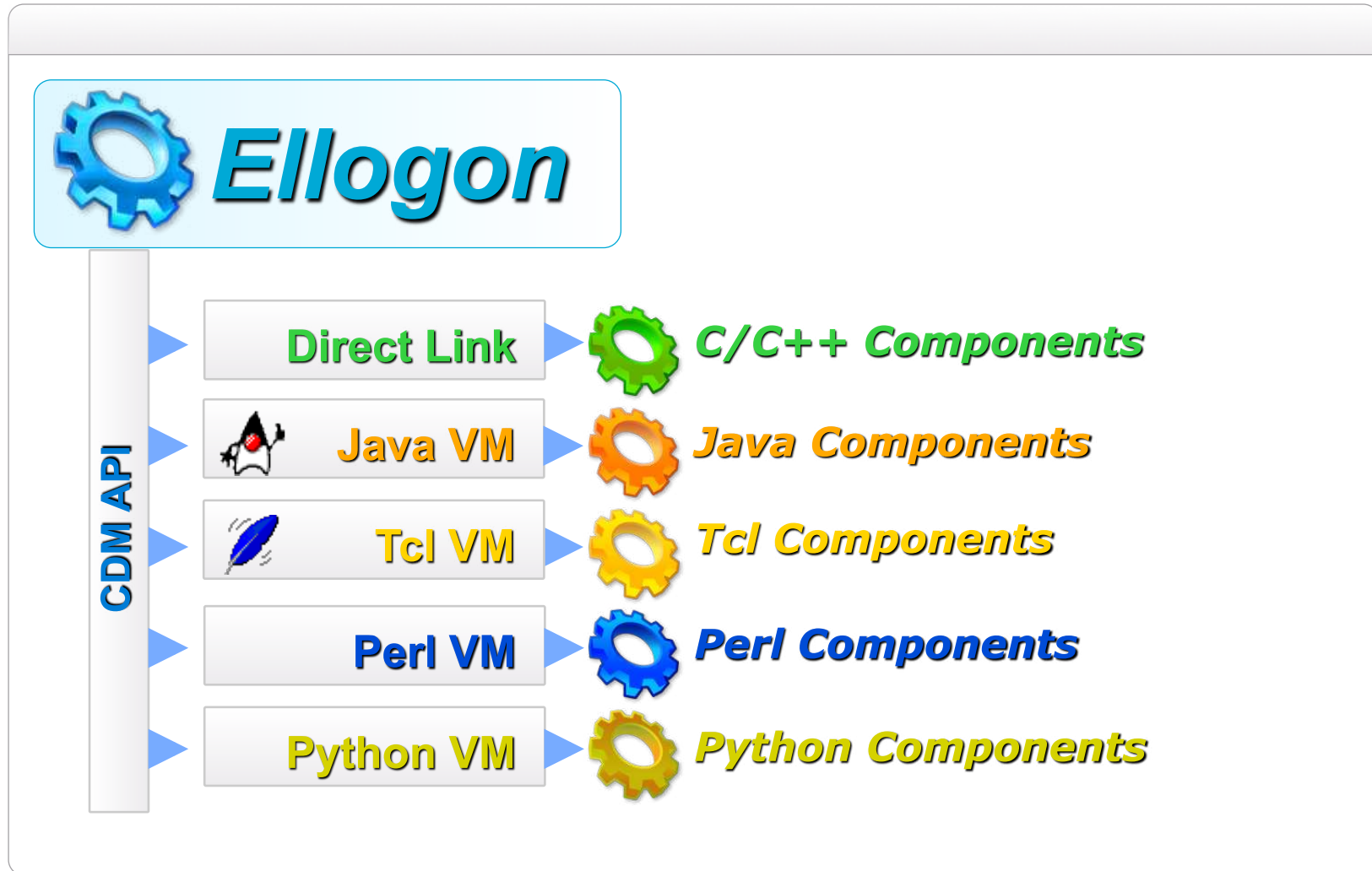


# Ellogon Architecture





# Ellogon: plug-ins in many programming languages





## The roadmap for Ellogon 2.0

The goals for Ellogon 2.0 are:

- Make Ellogon's core thread safe (done)
- Make Ellogon multi-threaded (feasible?)
  - How Ellogon & the Tcl thread model can cooperate?
- Modernise GUI (using OO and ttk widgets)
  - ~30% completed
  - Initially written in iTcl, now ported to TclOO
  - Includes a complete rewrite of **Annotation Tools** of Ellogon



## Annotation Tools: polymorphism required

Annotation tools is a very demanding area

- A lot of tasks that need annotated corpora
- Each task, may have its own annotation scheme
- Each group, may pose different requirements for the tool

The first generation of tools was:

- coded in plain Tcl/Tk
- difficult to adapt/extend



# First generation tools (1)

Window title: Edit Annotations Tool: Editing Attribute pos in Annotations token

This is a demo of Ellogon. It is a multi-lingual, cross-platform, general-purpose text engineering environment. Ellogon provides a powerful infrastructure for managing textual data. Embed text processing components and manage them with Ellogon. Some key features include full Unicode support, extensive multi-lingual graphical user interface and modular architecture.

!	DDT	JJSM	NNPSN	UH
"	DP	JJSN	NNS	VB
(	DT	LS	NNSF	VBD
)	FW	MD	NNSM	VBDS
,	IDT	NN	NNSN	VBF
.	IN	NNF	PERIOD	VBFS
:	INP	NNM	PP	VBG
;	IP	NNN	PRP	VBP
AB	JJ	NNPF	OP	VBPD
CC	JJF	NNPM	RB	VBPF
CD	JJM	NNPN	REP	VBS
COMMA	JJN	NNPSF	RP	VBZ
DATE	JJSF	NNPSM	SYM	WP

Automatic Tag

Delete Annotation

Delete Attribute

Dismiss



## First generation tools (2)

Enterprise.gr  
we know the web!

Τα τελευταία νέα ▾

Επικεφαλίδες ▾

► Επιχειρησιακό πρόγραμμα "Ανταγωνιστικότητα" Η Enterprise Software & Consulting αναπτύσσει συνεργασίες για την υποβολή προτάσεων στα πλαίσια του προγράμματος "ΕΝΙΣΧΥΣΗ ΟΛΟΚΛΗΡΩΜΕΝΩΝ ΕΠΙΧΕΙΡΗΜΑΤΙΚΩΝ ΣΧΕΔΙΩΝ ΠΟΛΥ ΜΙΚΡΩΝ ΚΑΙ ΜΙΚΡΩΝ ΕΠΙΧΕΙΡΗΣΕΩΝ".

Θέσεις εργασίας

Internet Applications Developers [Code:IAD]  
Οι υποψήφιοι θα δουλεύουν στην ανάπτυξη multi server applications για internet και intranet. Οι κατάλληλοι υποψήφιοι πρέπει να έχουν:

- Πτυχίο Πανεπιστημίου στην Πληροφορική ή σχετικό αντικείμενο.
- Γνώση Visual Basic, ActiveX dlls. Απαιτούνται για πλατφόρμας Windows DNA.
- Εξοικείωση σε SQL Database servers και / ή A servers θα θεωρηθεί προσόν.

Η εταιρία προσφέρει ανταγωνιστικό πακέτο από εκπαίδευση και δυνατότητες εξέλιξης, σε ένα μοντέρνο υψηλής τεχνολογίας εργασιακό χώρο.

Web & Database Developers [Code:WDD]  
Οι υποψήφιοι θα δουλεύουν στην ανάπτυξη, εγκατάσταση και συντήρηση Internet - intranet εφαρμογών, κυρίως λειτουργικό σύστημα Windows NT.

Select Overlapping: [ ]

Collection: (2nd\_Domain\_Greek\_All), Document: (B1\_enterprise\_1.html) cp1253



# First generation tools (3)

The screenshot shows a software window titled "Edit Annotation Hierachies Tool: Editing Attribute 'category' of Annotation 'syntax'". The window contains a sentence "To play a senior role in CPU design activity at ARM" with various words highlighted in colored boxes. A hierarchical tree diagram is shown below the sentence, with arrows pointing from "np" to "a", "np", and "np", and from "np" to "senior" and "role". The text editor view at the bottom shows the sentence "To play a senior role in CPU design activity at ARM" with the words "To play a senior role in CPU design activity at ARM" highlighted in blue. The window also displays a collection name "2nd\_Domain\_English\_Tes" and a document name "A1\_arm\_1.html".





# Second generation tools (1)

Text Visual Annotation Editor...

File Window

Collection news articles collectio Document 51345.txt

KABUL, Afghanistan - Insurgents carrying rockets and grenades launched a brazen pre-dawn attack on a giant U.S.-run base north of Afghanistan's capital on Wednesday, leaving at least 10 guerrillas dead and 7 foreign troops wounded.

The attack on Bagram air base, about an hour's drive north of Kabul, continued into daylight with sporadic fire of rockets and small arms outside. One rocket landed inside the base, causing minor damage, but no insurgents managed to get inside Bagram, according to NATO. Helicopter gunships hovered above Bagram, the main base for the U.S.-led troops in Afghanistan with the largest airfield in the country. It was used by the former Soviet Union during its invasion of the country in the 1980s.

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The assault started when security personnel noticed one of the attackers wearing a suicide vest in a car outside the base, NBC News Correspondent Tom Aspell in Kabul reported.

"It looks like (the attackers) were trying to crash in through one of the main gates," he said.

Afghan troops killed seven of the estimated 20 militants, Aspell said, and the assault was over by midday.

Taliban offensive

The Bagram attack came one day after a suicide bomber struck a U.S. convoy in Kabul, killing 18 people. The Kabul dead included five American troops and a Canadian.

Overlapping areas: 0

Collection:(C:/Users/George/Collections/news articles collection\_240610), Document:(51345.txt)

Button Annotator Automatic Annotator Annotation Highlighter 1-Click Selector

Tags

what	what2	who
to_whom	publish_date	predicate

Tags + Description

when	
where	
reporter_location	

Segments + Event + IPTC code

main	
secondary	

Sentiment

positive	neutral	negative
----------	---------	----------

Found in Collection



## Second generation tools (2)

Text Visual Annotation Editor...

File Window

Collection news articles collectio Document 51345.txt

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Overlapping areas: 0

Collection:(C:/Users/George/Collections/news articles collection\_240610), Document:(51345.txt)

Button Annotator Automatic Annotator Annotation Highlighter 1-Click Selector

Automatic Acquisition Regular Expressions Automatic Application

Automatically Acquire Regular Expressions

Exclude Values:

- main
- negative
- neutral
- positive
- predicate
- publish\_date
- reporter\_location
- secondary
- to\_whom
- what
- what2
- when



## Second generation tools (3)

The screenshot shows the 'Text Visual Annotation Editor' window. The main text area contains a news article snippet about an attack in Afghanistan. The first sentence is highlighted in blue, and the word 'Kabul' is highlighted in yellow. The interface includes a menu bar (File, Window), a toolbar with icons for file operations and annotation actions, and a right-hand panel with tabs for 'Button Annotator', 'Automatic Annotator', 'Annotation Highlighter', and '1-Click Selector'. The 'Annotation Highlighter' tab is active, showing a tree view of annotation types/attributes for the selected text, including 'sync3\_event', 'country', 'date', 'event', and 'type'. At the bottom, there are color selection buttons for 'Background Colour' and 'Foreground Colour', along with 'Apply' and 'Remove' buttons. The status bar at the bottom indicates the current collection and document path.

Text Visual Annotation Editor...

File Window

Collection news articles collectio Document 51345.txt

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Overlapping areas: 0

Collection:(C:/Users/George/Collections/news articles collection\_240610), Document:(51345.txt)

Button Annotator Automatic Annotator Annotation Highlighter 1-Click Selector

Annotation Types/Attributes	Values
sync3_event	
country	
date	
event	
type	

Colour: Background Colour Foreground Colour Apply Remove



## Second generation tools (4)

The screenshot shows the 'Text Visual Annotation Editor' window. The main text area contains a news article snippet about an attack in Kabul, Afghanistan. The text is annotated with colored boxes: yellow for 'KABUL, Afghanistan', blue for 'Insurgents carrying rockets and grenades launched a brazen pre-dawn attack on a giant U.S.-run base north of Afghanistan's capital on Wednesday, leaving at least 10 guerrillas dead and 7 foreign troops wounded', and green for 'Wednesday'. The interface includes a menu bar (File, Window), a toolbar with icons for file operations and 'Delete Annotation' and 'Automatic Annotator' buttons. On the right, there are tabs for 'Button Annotator', 'Automatic Annotator', 'Annotation Highlighter', and '1-Click Selector'. The 'Annotation Highlighter' tab is active, showing 'Mouse Buttons' (radio buttons for <1>, <2>, <3>, <Control-1>, <Control-2>, <Control-3>, <Shift-1>, <Shift-2>, <Shift-3>, <Alt-1>, <Alt-2>, <Alt-3>) and a 'Pattern Editor' with a text input field containing the regex `lw+ (\d+)?\d+\.\d+` and buttons for 'Add', 'Edit', 'Delete', 'Save', and 'Load'. The status bar at the bottom shows the file path: 'Collection:(C:/Users/George/Collections/news articles collection\_240610), Document:(51345.txt)'.



# Second generation tools (5)

Text Visual Annotation Editor (with Annotation-based text selection)...

File Window

Collection news articles collectio Document 51345.txt

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At least 10 insurgents were killed in the attack, which started at about 3 a.m. with rockets, small arms and grenades fired into the base, said Maj. Virginia McCabe, a spokeswoman for U.S. forces at Bagram. Seven U.S. service members have been wounded, she said.

Video

May 18: A Taliban suicide car bomber attacked a NATO-led military convoy during rush hour in the Afghan capital on Tuesday, killing 12 Afghan

Overlapping areas: 0

Collection:(C:/Users/George/Collections/news articles collection\_240610), Document:(51345.txt)

sync3\_event

ID	type	country	event	date
0	reporter_lo			
1	what		7	
2	main		7	
6	where			

Tree view

Ensure selected Annotation is visible

Button Annotator Automatic Annotator Annotation Highlighter 1-Click Selector

Tags

what	what2	who
to_whom	publish_date	predicate

Tags + Description

when	
where	
reporter_location	

Segments + Event + IPTC code

main		
secondary		

Sentiment

positive	neutral	negative
----------	---------	----------

Found in Collection



# Second generation tools (6)

Text Visual Annotation Editor (with Events)...

File Window

Collection news articles collectio Document 51345.txt

Delete Annotation Automatic Annotator

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Overlapping areas: 0

Collection:(C:/Users/George/Collections/news articles collection\_240610), Document:(51345.bt)

ID	P	Title
7	1	Afghan Taliban militants (suicide bombers) attacked a m...
9	1	A Taliban suicide car bomber attacked a NATO-led Inter...
10	1	The Pakistan Telecommunication Authority blocked acc...
12	1	Taliban militants attacked the NATO base in Kandahar w...
13	1	Google CEO Eric Schmidt has launched on Thursday in ...
14	1	Wednesday, the Lahore High Court in Pakistan has orde...

Button Annotator Automatic Annotator Annotation Highlighter 1-Click Selector

Tags

what	what2	who
to_whom	predicate	

Tags + Description

when	
where	
reporter_location	
publish_date	

Segments + Event + IPTC code

main	
secondary	

Sentiment

positive	neutral	negative
----------	---------	----------

Found in Collection



# Second generation tools (7)

Text Visual Annotation Editor...

File Window

Collection news articles collectio Document 51345.txt

Document Viewer Filled Tables (Compact) Filled Tables (Extended)

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Video

May 18: A Taliban suicide car bomber attacked a NATO-led military convoy during rush hour in the Afghan capital on Tuesday, killing 12 Afghan civilians and at least six NATO troops.

Nightly News

The Taliban claimed responsibility for the Bagram strike. Taliban spokesman Zabiullah Mujahid said 20 suicide attackers carried out the attack.

Overlapping areas: 0

Collection:(C:/Users/George/Collections/news articles collection\_240610), Document:(51345.txt)

Button Annotator Table Filler Template Filler Automatic Annotator Annotation Highlighter 1-Click Selector

event sport round trial athlete

Table: New

Sport name: + -

Start date: + -

End date: + -

City: + -

Stadium name: + -

Relates to event: + -

Automatic Add Clear Fields Add Table

Tables

Id	Value	C
----	-------	---



# Second generation tools (8)

Text Visual Annotation Editor...

File Window

Collection news articles collectio Document 51345.txt

Document Viewer Filled Tables (Compact) Filled Tables (Extended)

KABUL, Afghanistan - Insurgents carrying rockets and grenades launched a brazen pre-dawn attack on a giant U.S.-run base north of Afghanistan's capital on Wednesday, leaving at least 10 guerrillas dead and 7 foreign troops wounded.

The attack on Bagram air base, about an hour's drive north of Kabul, continued into daylight with sporadic fire of rockets and small arms outside. One rocket landed inside the base, causing minor damage, but no insurgents managed to get inside Bagram, according to NATO. Helicopter gunships hovered above Bagram, the main base for the U.S.-led troops in Afghanistan with the largest airfield in the country. It was used by the former Soviet Union during its invasion of the country in the 1980s.

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The assault started when security personnel noticed one of the attackers wearing a suicide vest in a car outside the base, NBC News Correspondent Tom Aspell in Kabul reported.

"It looks like (the attackers) were trying to crash in through one of the main gates," he said.

Afghan troops killed seven of the estimated 20 militants, Aspell said, and the assault was over by midday.

Taliban offensive

The Bagram attack came one day after a suicide bomber struck a U.S. convoy in Kabul, killing 18 people. The Kabul dead included five American troops and a Canadian.

The back-to-back strikes appeared part of a Taliban offensive that the insurgents announced earlier this month — even as the U.S. and its partners prepare for a major operation to restore order in the turbulent south. The insurgent attacks against both the capital and a major American military installation show the militants are prepared to strike at the heart of the U.S.-led mission.

At least 10 insurgents were killed in the attack, which started at about 3 a.m. with rockets, small arms and grenades fired into the base, said Maj. Virginia McCabe, a spokeswoman for U.S. forces at Bagram. Seven U.S. service members have been wounded, she said.

Video

May 18: A Taliban suicide car bomber attacked a NATO-led military convoy during rush hour in the Afghan capital on Tuesday, killing 12 Afghan civilians and at least six NATO troops.

Nightly News

The Taliban claimed responsibility for the Bagram strike. Taliban spokesman Zabiullah Mujahid said 20 suicide attackers carried out the attack.

Overlapping areas: 0

Collection:(C:/Users/George/Collections/news articles collection\_240610), Document:(51345.txt)

Button Annotator Table Filler Template Filler Automatic Annotator Annotation Highlighter 1-Click Selector

Template: New

event Automatic Fill

sport Automatic Fill

round Automatic Fill

trial Automatic Fill

athlete Automatic Fill

Clear Fields Add Template

Templates

Id	Value
----	-------





# Second generation tools (9)

The screenshot shows the 'Text Visual Annotation Editor' window. The title bar reads 'Text Visual Annotation Editor...'. The menu bar includes 'File' and 'Window'. The status bar at the top indicates 'Collection: news articles collectio' and 'Document: 51345.txt'. Below the menu bar is a toolbar with icons for 'Delete Annotation' and 'Automatic Annotator'. A tabbed interface shows 'Filled Tables (Compact)' as the active tab, with 'Filled Tables (Extended)' also visible. The main workspace is divided into two panes. The left pane, titled 'Document Viewer', contains five tables, each with a header row 'Id Value' and an empty body. The tables are labeled 'event', 'sport', 'round', 'trial', and 'athlete'. The right pane contains a 'Template: New' section with five rows, each with a text input field and an 'Automatic Fill' button. Below this are two buttons: 'Clear Fields' (orange) and 'Add Template' (green). At the bottom of the right pane is a 'Templates' section with a table header 'Id Value' and an empty body. The status bar at the bottom of the window displays the path: 'Collection:(C:/Users/George/Collections/news articles collection\_240610), Document:(51345.txt)'.



# Second generation tools (10)

The screenshot shows the 'Aligned Text Visual Annotation Editor' interface. The main window displays two columns of text: Greek on the left and English on the right. The text is aligned line-by-line. Various words and phrases are highlighted with colored boxes (green, yellow, red, blue) to indicate annotations. For example, 'θα συμβάλει στη βελτίωση' is highlighted in green, 'στην προώθηση' in red, and 'and vegetables' in blue. The right-hand side of the window features a control panel with tabs for 'Coreference Annotator', 'Annotation Highlighter', and '1-Click Selector'. The 'Annotation Highlighter' tab is active, showing a table with columns for 'Attribute', 'Text', 'Start', and 'End'. Below this, there are several input fields and checkboxes for configuring annotations, such as 'ST EN', 'ST Rhetorical Relation', 'ST Category', 'ST Phrase-level Connection', 'ST Position', 'TT EL', 'TT EL Expression', 'TT Rhetorical Relation', 'Omission', 'TT Category', 'TT Phrase-level Connection', 'TT Position', 'ST Comment', and 'TT Comment'. A 'TT ADDITION' section is also visible at the bottom of the control panel. The status bar at the bottom indicates the current collection and document path.



# Classes Decomposition (1)

The screenshot shows a software interface titled "Text Visual Annotation Editor (with Events)". It features a main text area on the left and a control panel on the right. Red and green boxes highlight specific areas, with red arrows pointing to labels. The labels are: "ToplevelWindow" (pointing to the main window frame), "DocumentSelector" (pointing to the top toolbar), "TextWidgetDisplay" (pointing to the main text area), "EventDefiner" (pointing to a table of events), and "ButtonAnnotator" (pointing to the bottom control panel).

**ToplevelWindow**

**DocumentSelector**

**TextWidgetDisplay**

**EventDefiner**

**ButtonAnnotator**

ID	P	Title
7	1	Afghan Taliban militants (suicide bombers) attacked a m...
9	1	A Taliban suicide car bomber attacked a NATO-led Inter...
10	1	The Pakistan Telecommunication Authority blocked acc...
12	1	Taliban militants attacked the U.S. base in Kandahar w...
13	1	Google CEO Eric Schmidt has launched on Thursday in ...
14	1	Wednesday, the Lahore High Court in Pakistan has orde...

Button Annotator Automatic Annotator Annotation Highlighter 1-Click Selector

Tags

what	what2	who
to_whom	predicate	

Tags + Description

when	
where	
reporter_location	
publish_date	

Segments + Event + IPTC code

main	
secondary	

Sentiment

positive	neutral	negative
----------	---------	----------

Found in Collection

Collection: (C:/Users/George/Collections/news articles collection\_240610), Document: (51345.bt)



## Classes Decomposition (2)

```
oo::class create ELEM::VisualAnnotators::TextAnnotatorWithEvents {
  superclass ELEM::VisualAnnotators::TextAnnotator

  method createRightTopAreaWidgets {pane} {
    my variable event_definer_object
    my createEventDefinerObject $pane
    $pane add [$event_definer_object getframe] -weight 1
  };# createRightTopAreaWidgets

  method createEventDefinerObject {parent} {
    my variable event_definer_object selector_object
    set event_definer_object [ELEM::ViewerBase::EventDefiner create\
      [::ELEM::Base::auto ELEM::VisualAnnotators::] $parent]
    $selector_object registerListener $event_definer_object
  };# createEventDefinerObject

  method createAnnotatorObject {parent} {
    my variable annotator_object event_definer_object
    next $parent
    $annotator_object configure -event_definer_object $event_definer_object
  };# createAnnotatorObject

  method setTitle {} {
    my title {Text Visual Annotation Editor (with Events)...}
  };# setTitle
};# class ELEM::VisualAnnotators::TextAnnotatorWithEvents
```



# Overview

- The shock of Tcl 8.6
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# Ellogon TclOO classes: cget/configure

```
Utilities.tcl (D:\Users\peta...2.0\lib_elep\ELEP_Base) - GVIM1
File Edit Tools Syntax Buffers Window Help
[Icons]
###
### Define cget/configure for all classes!
###
oo::define oo::object method cget {_elep_oo_variable_name} {
  ## Remove the preciding "-" character...
  set _elep_oo_variable_name [string range $_elep_oo_variable_name 1 end]
  switch -glob -- $_elep_oo_variable_name {
    *(*) {
      ## This is an array index!
      lassign [split $_elep_oo_variable_name ()] \
        _elep_oo_variable_array _elep_oo_variable_key
      my variable $_elep_oo_variable_array
    }
    default {
      my variable $_elep_oo_variable_name
    }
  }
  return [set $_elep_oo_variable_name]
};# cget
76,1 32%
```

re/



## Ellogon TclOO classes: common (1)

- TclOO has another trick:
  - Procedure `oo::define::<name>` extends `oo::class`
    - ✓ Implementing `::oo::define::common` allows to use the keyword “common” during class creation

```
proc ::oo::define::common {varname args} {
    if {[llength $args] > 1} { ... }
    # Get the name of the current class
    set cls [lindex [info level -1] 1]
    oo::define $cls self export varname; # Export method varname
    # Initialise the variable
    if {[llength $args]} {
        set [$cls varname $varname] [lindex $args 0]
    }
};# ::oo::define::common
```



## Ellogon TclOO classes: common (2)

- But common also needs a method to be called from methods accessing common variables

```
oo::define oo::object method common {args} {  
  if {![llength $args]} return  
  set callclass [lindex [self caller] 0]  
  oo::define $callclass self export varname  
  foreach vname $args {  
    lappend pairs [$callclass varname $vname] $vname  
  }  
  uplevel 1 upvar {*}$pairs  
};# common
```

- Common and my cget/configure do not mix





# Ellogon TclOO classes: class methods (1)

```
## Define "classmethod"...\nproc ::oo::define::classmethod {name {args ""} {body ""}} {\n  # Code from: http://wiki.tcl.tk/21595#pagetoce30e53a1\n  set argc [llength [info level 0]]\n  if {$argc == 4} {\n    uplevel 1 [list self method $name $args $body]\n  } elseif {$argc == 3} {\n    return -code error "..."\n  }\n  # Get the name of the current class\n  set cls [lindex [info level -1] 1]\n  # Get its private "my" command\n  set my [info object namespace $cls>::my\n  # Make the connection by forwarding\n  tailcall forward $name $my $name\n};# ::oo::define::classmethod
```



## Ellogon TclOO classes: class methods (2)

- What about inheritance?

```
oo::class create ELEP::Base::Utilities {  
  classmethod userAppDir {} {...}  
}
```

```
oo::class create ELEP::System::System {  
  superclass ELEP::Base::Utilities  
  classmethod systemConfigurationDir {} {  
    return [my userAppDir]/Systems/Config  
  };# systemConfigurationDir
```

- unknown method "userAppDir"



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## Widget classes (1)

- In Ellogon, I don't think in terms of Tk widgets
  - In fact, I totally ignore them
- Only 3 classes available, which represent widgets
  - Toplevel, Dialog, Widget, RibbonToplevel
    - ✓ RibbonToplevel has a Windows Ribbon instead of a menu
- Some common methods for all classes
  - getToplevel
  - getToplevelObject
  - getClientArea
- Automatic variables
  - win for toplevel/dialogs
  - widget for widgets



## Widget classes (2)

- Widgets are destroyed when objects are deleted, and vice versa
  - In a way similar to iTk
- Toplevel/Dialogs generate widgets based on the object names
- Objects of the Widget class need the widget type and name
  - i.e. `Widget ttk::button .button ?args?`



## Ellogon building blocks

- Many building blocks that inherit Widget
  - Only the Tk widget that will contain the block is required (the “parent”)
  - i.e. ButtonAnnotator, 1-Click selector, TemplateFiller, TextViewer, HTMLViewer, AlignedTextViewer, etc.
- A generic class that represents an Annotation tool
  - Inherits from Toplevel
  - Splits client area into two columns, separated by a `ttk::panedwindow`
- All tools, subclass this class, add another layout if required, and create/place building block objects



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# Creating an Annotation Tool

- Gluing building blocks is easy, but what about the user experience?
- Lets see an example, by creating an Annotation tool that annotates a document with a semantic model (i.e. an ontology)
  - For this task, the bits required are:
    1. An annotator to annotate “properties” found in the text
    2. An annotator to group properties into objects
    3. An annotator to group objects into other objects





# Annotating properties: the button annotator (1)

The screenshot shows the 'Text Visual Annotation Editor' window. The main text area contains a news article snippet about an attack in Afghanistan. The text is annotated with colored boxes: 'KABUL, Afghanistan' is highlighted in yellow, 'Insurgents carrying rockets and grenades launched a brazen pre-dawn attack on a giant U.S.-run base north of Afghanistan's capital on Wednesday, leaving at least 10 guerrillas dead and 7 foreign troops wounded.' is highlighted in blue, and 'Kabul' is highlighted in yellow. The right-hand side of the window displays the 'Button Annotator' panel, which is currently selected. This panel shows various annotation categories and their corresponding colors:

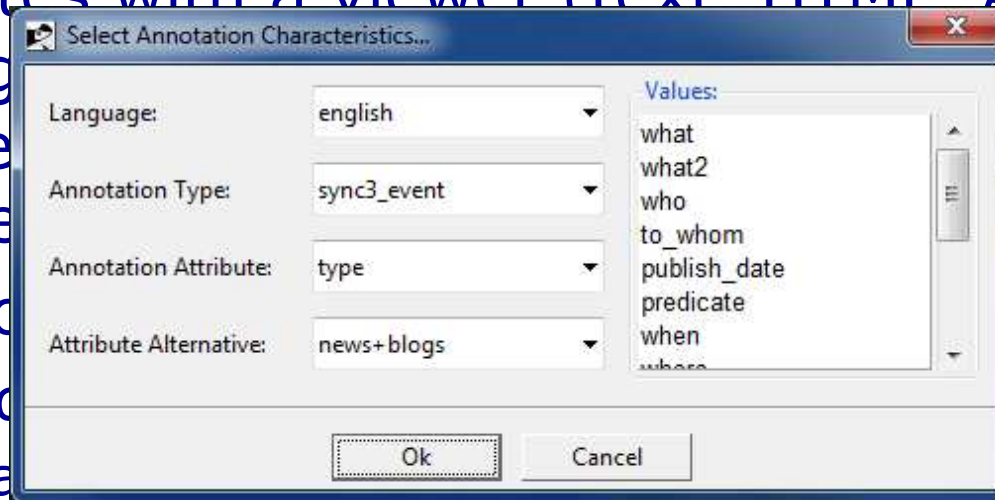
- Tags:** 'what' (blue), 'what2' (red), 'who' (purple), 'to\_whom' (red), 'publish\_date' (pink), 'predicate' (orange).
- Tags + Description:** 'when' (green), 'where' (yellow), 'reporter\_location' (yellow).
- Segments + Event + IPTC code:** 'main' (purple), 'secondary' (grey).
- Sentiment:** 'positive' (red), 'neutral' (green), 'negative' (blue).
- Found in Collection:** (empty)

At the bottom of the window, the status bar shows the collection path: 'Collection:(C:/Users/George/Collections/news articles collection\_240610), Document:(51345.txt)'.



## Annotating properties: the button annotator (2)

- Cooperates with a viewer (text HTML) Aligned to text, Align to more properties
- The annotator
  - Method `create()`
    - ✓ Create object
  - Method `show()`
    - ✓ Calls `AnnotationSpecificationSelector.show()` and waits for an answer
  - Various schemas are read from an XML file, and presented to the user
  - Button annotator adapts to the selected schema





## Grouping properties/objects

- The TemplateFiller annotator
- Again presents a dynamic schema
- Now method createSpecificationSelectorObject()
  - Creates an AnnotationAndTemplateSpecificationSelector object
- How easy is to mix the two annotators?
  - Easy, just create the two objects and place them on a single annotation tool
- Any disadvantages?
  - Yes. The user gets two dialogs for configuring a single tool!



## The multiple dialog issue

How can this be resolved?

- A new class must be created, which is the concatenation of the two configuration dialogs
- The two objects must somehow create and use the same configuration object



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## Concatenating dialogs (1)

- In iTcl was very easy:
  - Create a new class that inherits the two configuration objects
  - iTcl has the ability to call explicitly methods from the class hierarchy:
    - ✓ Method populateDialogFrame() just creates two ttk::labelframe and calls populateDialogFrame() of the two inherited classes with the proper parent frame.
- In TclOO the task is far more complex!
  - You cannot simply inherit both classes



## Concatenating dialogs (2)

The best alternative?

- Create a new class that behaves as both configuration selectors, and drives instances of the two selectors internally
  - The new class must have all methods of the two objects
  - The new class must have all the public variables of both objects (so as cget/configure to work)



# Exposing variables of contained objects

1. Declare all variables as "automatic"
  - i.e. in class, with the "variable" keyword
2. Use "upvar" to link variables between two objects

```
oo::class create ELEP::ViewerBase::AnnotationAndTemplateSpecificationSelector {
  variable dialog_window ann_selector templ_selector \
    language annotation attribute alternative groups values \
    template tables
  method init {} {
    set ann_selector [ELEP::ViewerBase::AnnotationSpecificationSelector \
      create [::ELEP::Base::auto ::ELEP::ViewerBase::] 0]
    set templ_selector [ELEP::ViewerBase::TemplateSpecificationSelector \
      create [::ELEP::Base::auto ::ELEP::ViewerBase::] 0]
    oo::objdefine $ann_selector export varname
    foreach var {language annotation attribute alternative groups values} {
      upvar [$ann_selector varname $var] [my varname $var]
    }
    oo::objdefine $templ_selector export varname
    foreach var {template tables} {
      upvar [$templ_selector varname $var] [my varname $var]
    }

    my createReader
    my createDialog
    my populateDialogFrame [$dialog_window getframe]
    my restoreState      [$dialog_window getframe]
  };# init
}
```





## Exposing methods of contained objects

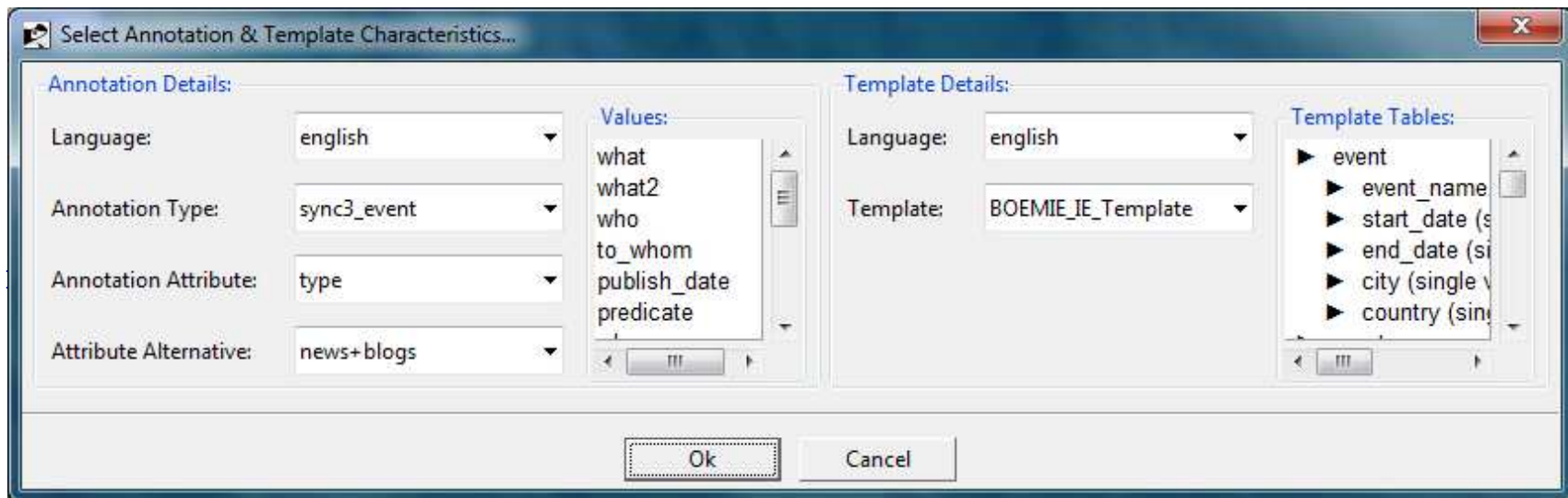
- Methods from both contained objects must be exposed - through “unknown”

```
method unknown {args} {  
    ## Try to call the aggregated objects...  
    if {![catch {$ann_selector {*} $args} result]} {  
        return $result  
    }  
    if {![catch {$templ_selector {*} $args} result]} {  
        return $result  
    }  
    next unknown {*} $args  
};# unknown
```



# Problems solved?

- So, are all problems solved?
  - No



```
method restoreState {frame} {  
    $ann_selector restoreState $frame.annotation  
    $templ_selector restoreState $frame.template  
};# restoreState
```



## What about efficiency?

- Is there a problem using unknown to “distribute” method calls to the proper object?
  - I don’t know, I haven’t measured
  - I assumed that there is a penalty, so I explored alternatives before implementing a similar approach for “merging” Button Annotator & Template Filler
- What I finally did, was to create a new class which
  - Inherits only ButtonAnnotator
  - The various methods of TemplateFiller are copied/extend methods of the new class
    - ✓ Thus “next” works, as there is only a linear hierarchy to follow
    - ✓ The configuration selector dialog object is single/common



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## TclOO: “gray” areas

- Mixins
  - I have used “mixin”s a few times, but what are really “mixin”s?
    - ✓ What happens with colliding method names, the constructor and inheritance?
- Inheritance
  - How do you inherit from classes whose constructors take different arguments?
  - The same issue can occur with plain methods and “next”
  - Is “next” limited, and an additional invocation method is required?



## Conclusions (1)

- Both iTcl & TclOO have their strengths and weaknesses
- iTcl:
  - Lacked support for unknown
  - I had to use the “@itcl ...” variable naming for serialising objects
  - info method is error-prone



## Conclusions (2)

- Both iTcl & TclOO have their strengths and weaknesses
- TclOO:
  - No support for calling a specific class method from the superclasses
  - Variables cannot be initialised without a constructor
  - Are traces supported?
    - ✓ Can constructor arguments be recorded?
- Should things like classmethod & common be moved from the wiki to the Tcl core?



Thank you!