

GTK Binding for Alice

Eine GTK-Schnittstelle für Alice

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Overview

- Concepts
- Implementation
- Demo
- Outlook

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- Concepts
 - GTK+
 - Mapping C Libraries to Alice
 - Event Handling
 - Garbage Collection
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GTK+

- Collection of libraries:

GnomeCanvas

- a special widget

GTK

- widget collection

GDK

- platform graphics abstraction

OS API

GTK+ - Main Ideas

- widgets
- attributes
- connect callback functions for handling events
- event-driven main loop
- automatic memory management

Mapping C Libraries to Alice

C Library contains:

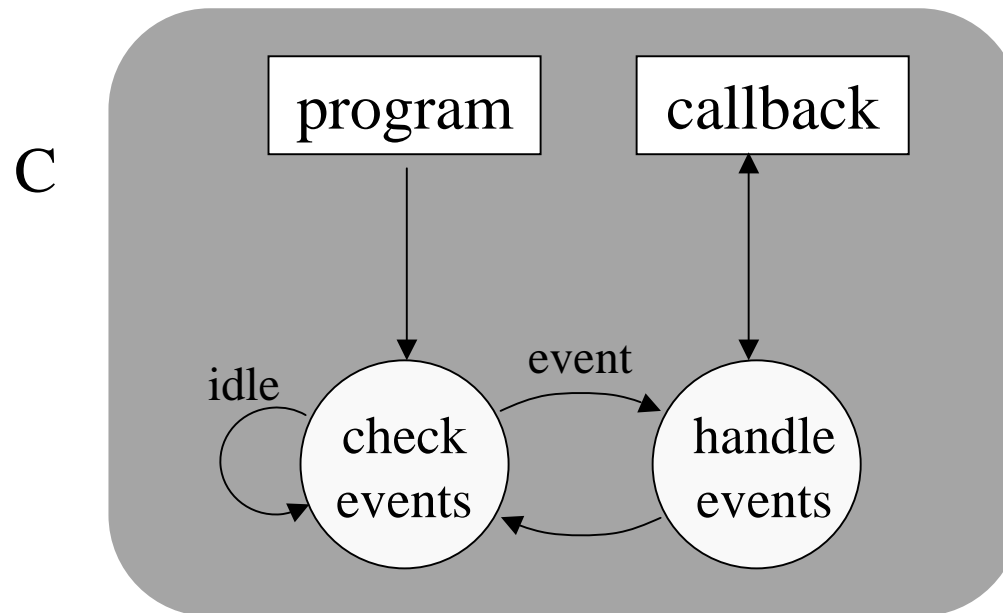
- functions
- structures
- constants

Alice Mapping:

- wrapper (marshalling)
- field accessor functions
- datatype constructors

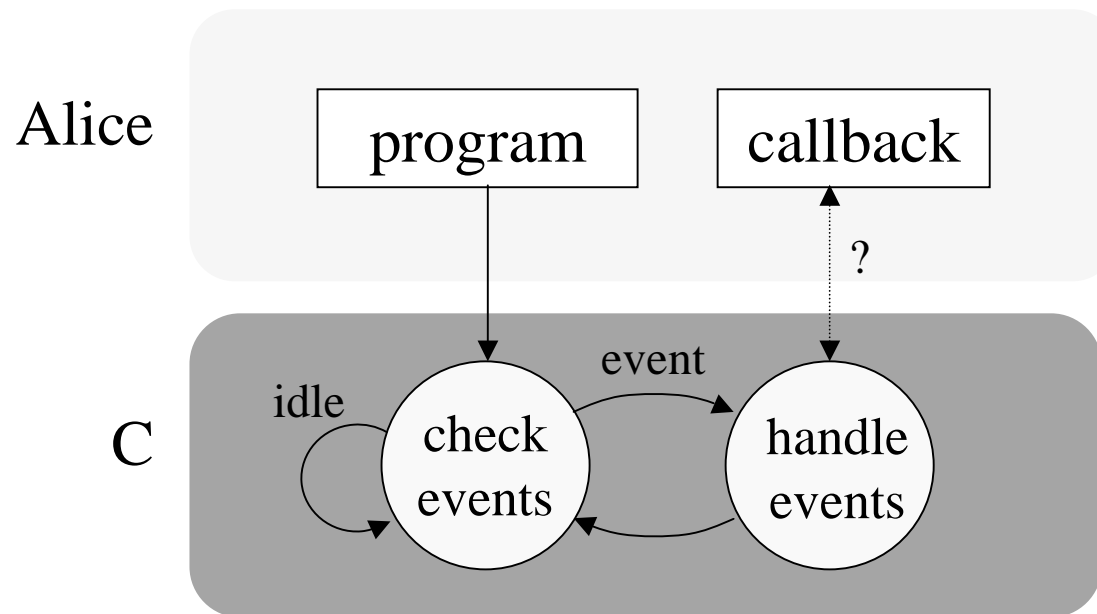
Event Handling in C

- delegate control to main loop...
- ...which invokes registered callback functions



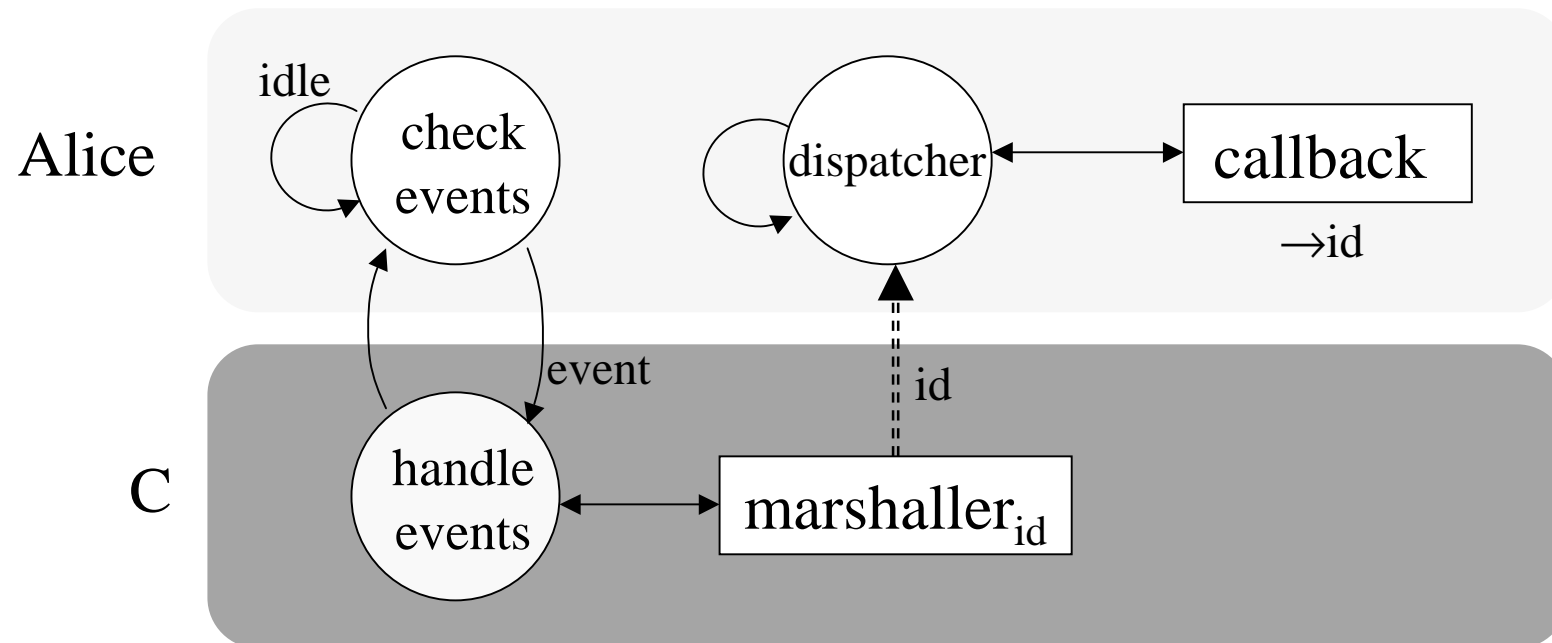
Naive Approach

- main loop never returns
→ breaks concurrency model
- cannot register Alice functions



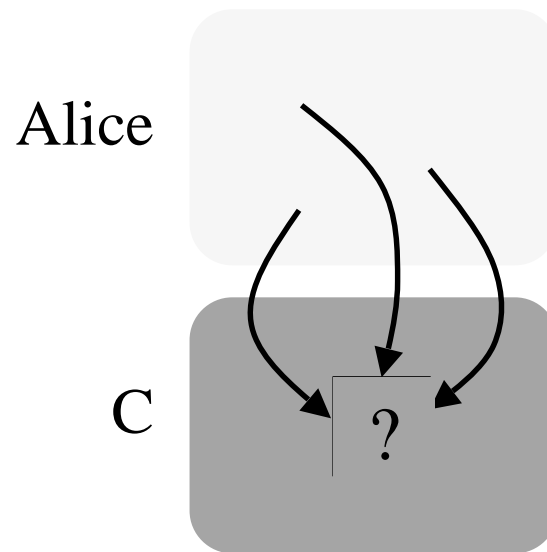
Solution

- split main loop
- asynchronous callback function call



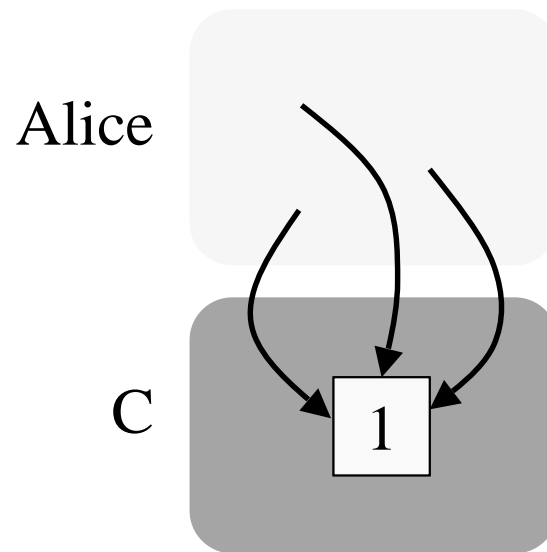
Garbage Collection

- GTK: own memory management
- reference counters
- Problem: GTK may delete object too early



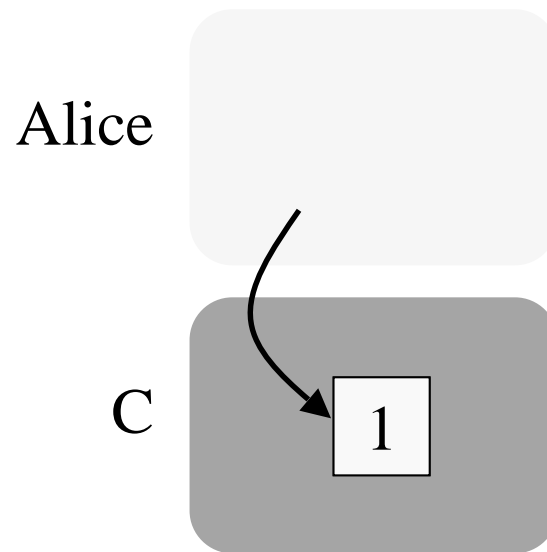
Solution

- keep reference to object while visible in Alice



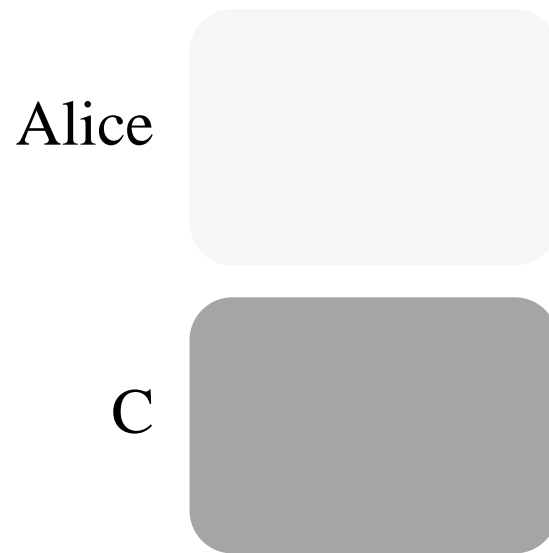
Solution

- keep reference to object while visible in Alice
- Alice finalization decreases counter



Solution

- keep reference to object while visible in Alice
- Alice finalization decreases counter

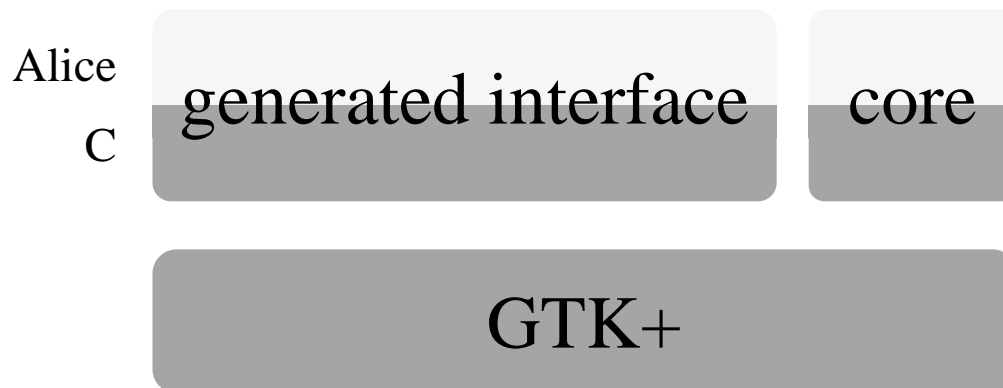


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 - Design
 - Generator
 - Type Mapping
 - Examples
- Demo
- Outlook

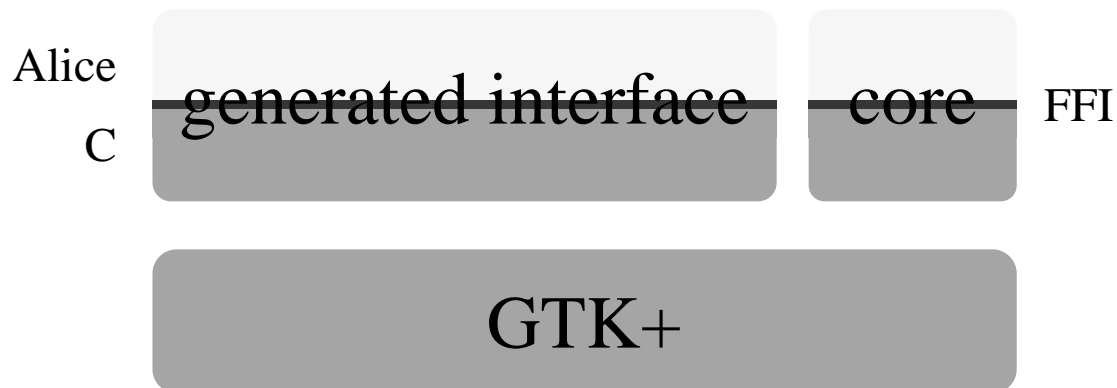
Design

- generated interface
 - function wrappers, constants, field accessors
- hand-written core
 - main loop, event handling, garbage collection

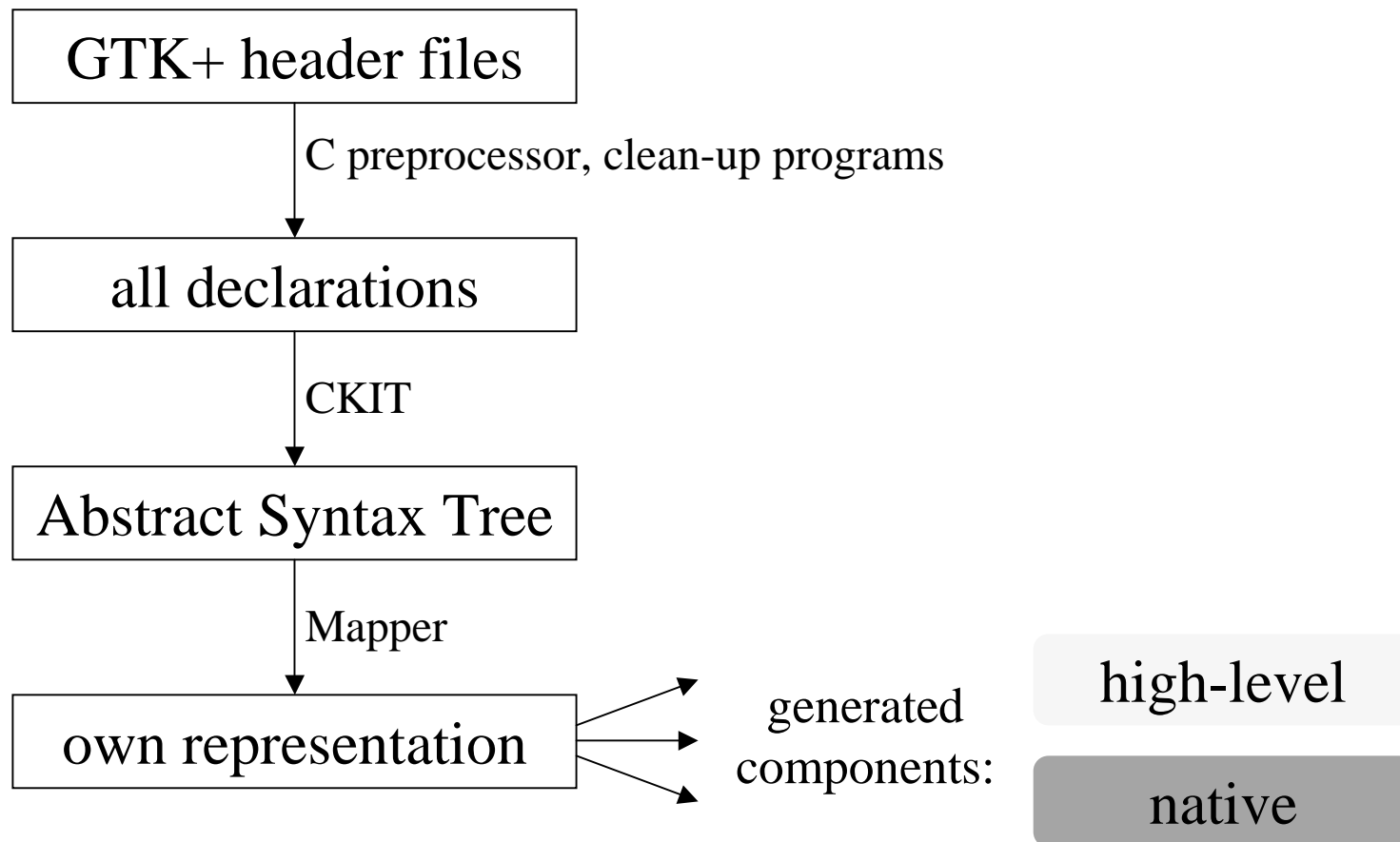


Design

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Generator



Type Mapping

C type	Alice type
void	unit
char, int	int
float, double	real
gboolean	bool
char*	string
$t[]$	t array
t^*	object

Constants

C-Deklaration:

```
typedef enum {  
    GTK_WINDOW_TOPLEVEL,  
    GTK_WINDOW_POPUP  
} GtkWidgetType;
```

Alice-Deklaration:

```
datatype GtkWidgetType =  
    WINDOW_TOPLEVEL  
| WINDOW_POPUP
```

Examples

- Simple example

```
void gtk_scale_set_draw_value(GtkScale*, gboolean)
```

```
val scaleSetDrawValue : object * bool → unit
```

- Input/Output argument example

```
void gtk_entry_get_layout_offsets (GtkEntry*, int*, int*)
```

```
val entryGetLayoutOffsets : object → int * int
```

```
val entryGetLayoutOffsets' : object * int * int → int * int
```

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Outlook

- GTK
 - high-level functional UI design
 - GtkBuilder
 - use advanced Alice features
- Generic Generator Tool
 - work in progress by Sven Woop