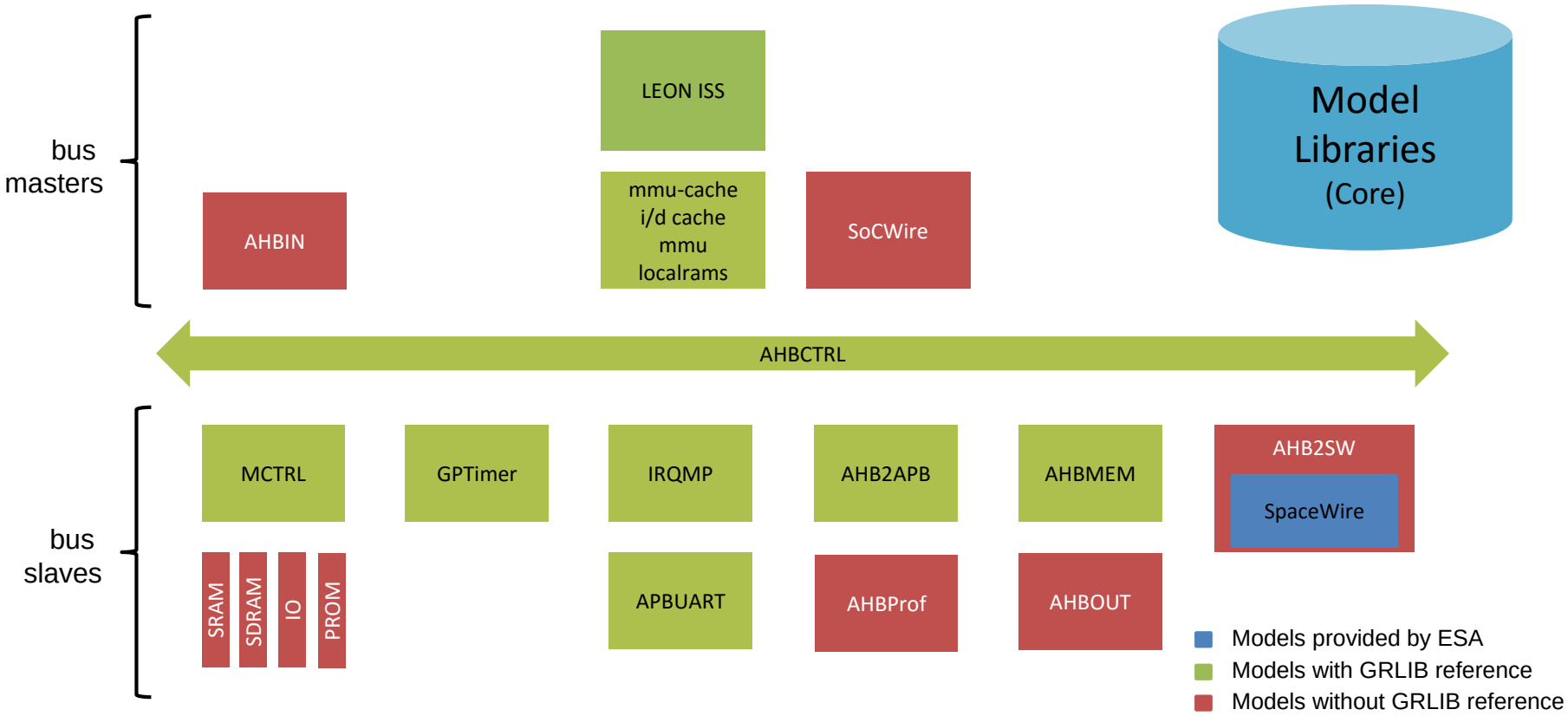
Universal Scripting Interface for SystemC

Rolf Meyer, E.I.S., TU Braunschweig

SoCRocket TLM Models

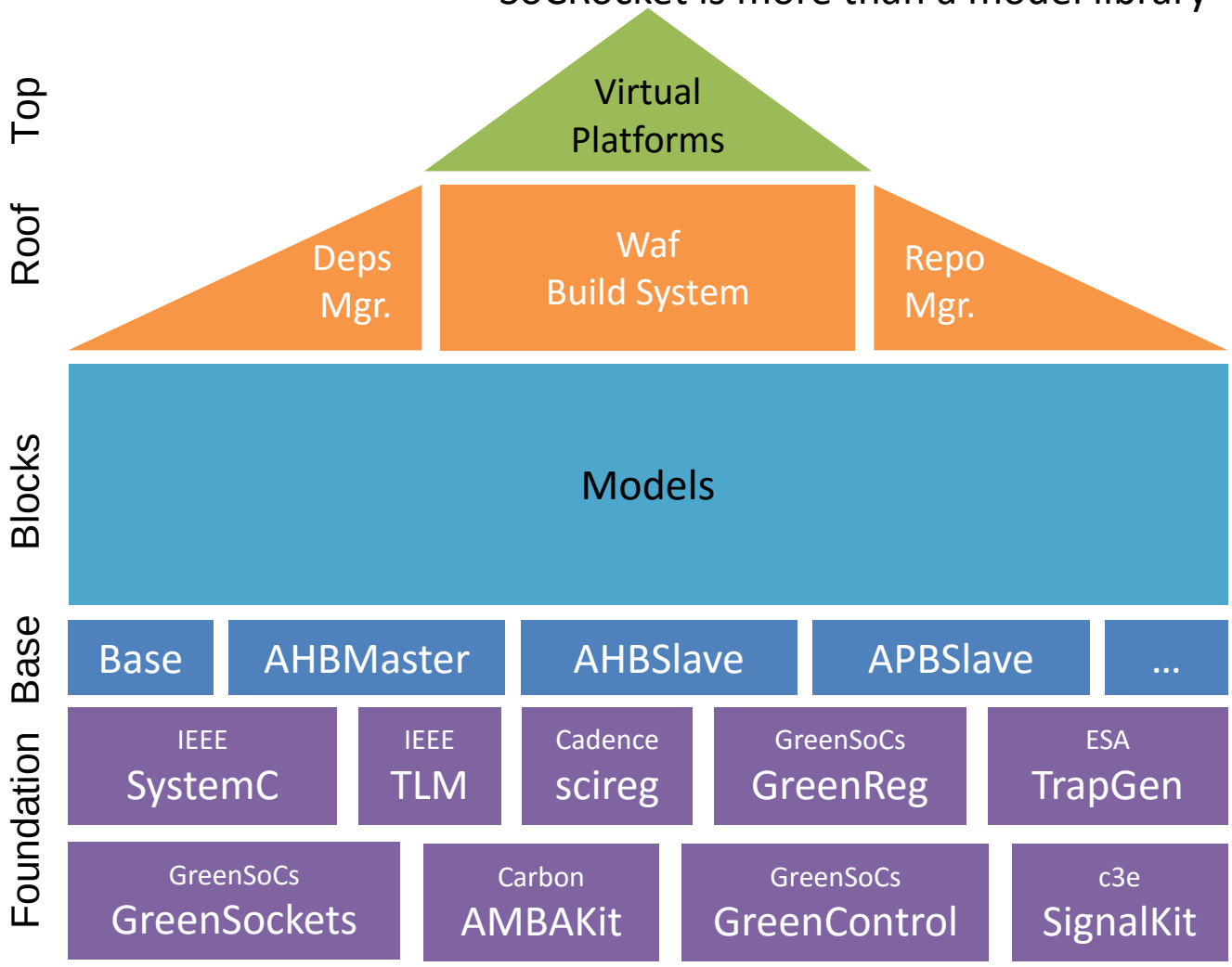
All models developed with RTL equivalents as blueprint

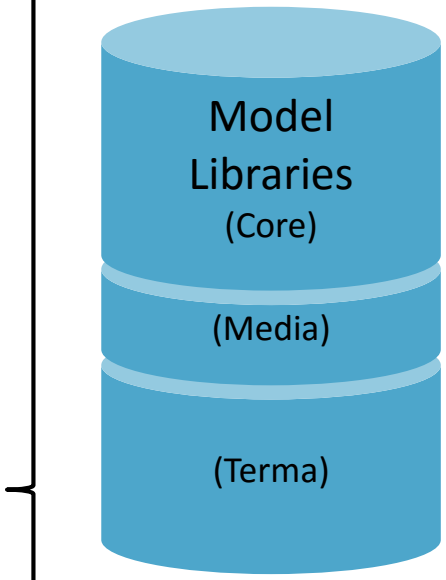


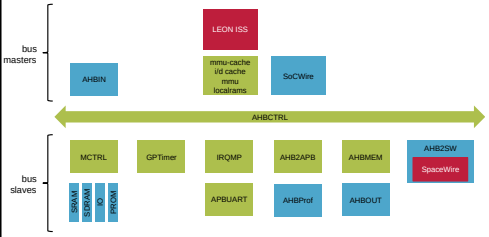
- Models available in loosely timed (LT), and approximately timed (AT) flavor of TLM2.0.
- ESA Reference TLM Platform

SoCRocket - The building blocks

SoCRocket is more than a model library







Desired Features

- Automating procedures
- Configuring simulation parameters
- Access runtime simulation information
- Easy testing integration
- Interactive introspection

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→ **Perfect tasks for scripting languages**

Scripting Language

- Defining variables/option values
- Recording/executing command sequences
- Capturing output results
- Branching and looping
- Importing and exporting options and
- Bridging the gaps to other abstraction levels

Available simulators

- Accellera SystemC
- ALDEC Riviera-PRO → TCL
- Cadence ncsim → TCL
- Mentor Graphics QuestaSim → TCL
- Synopsys Platform Architect → TCL
- …

- The choice depends on the problem/programmer

Scripting in EDA/SystemC

Most common: TCL

- Command oriented (Shell like)
- No native OOP
- Therefore not the best user experience

Scripting support in Accellera SystemC

- No integrated language
- Different approaches available

Scripting languages for SystemC

Existing implementations

- TCL
- SystemLua → focused on configuration
- GreenScript → focused on abstract modeling

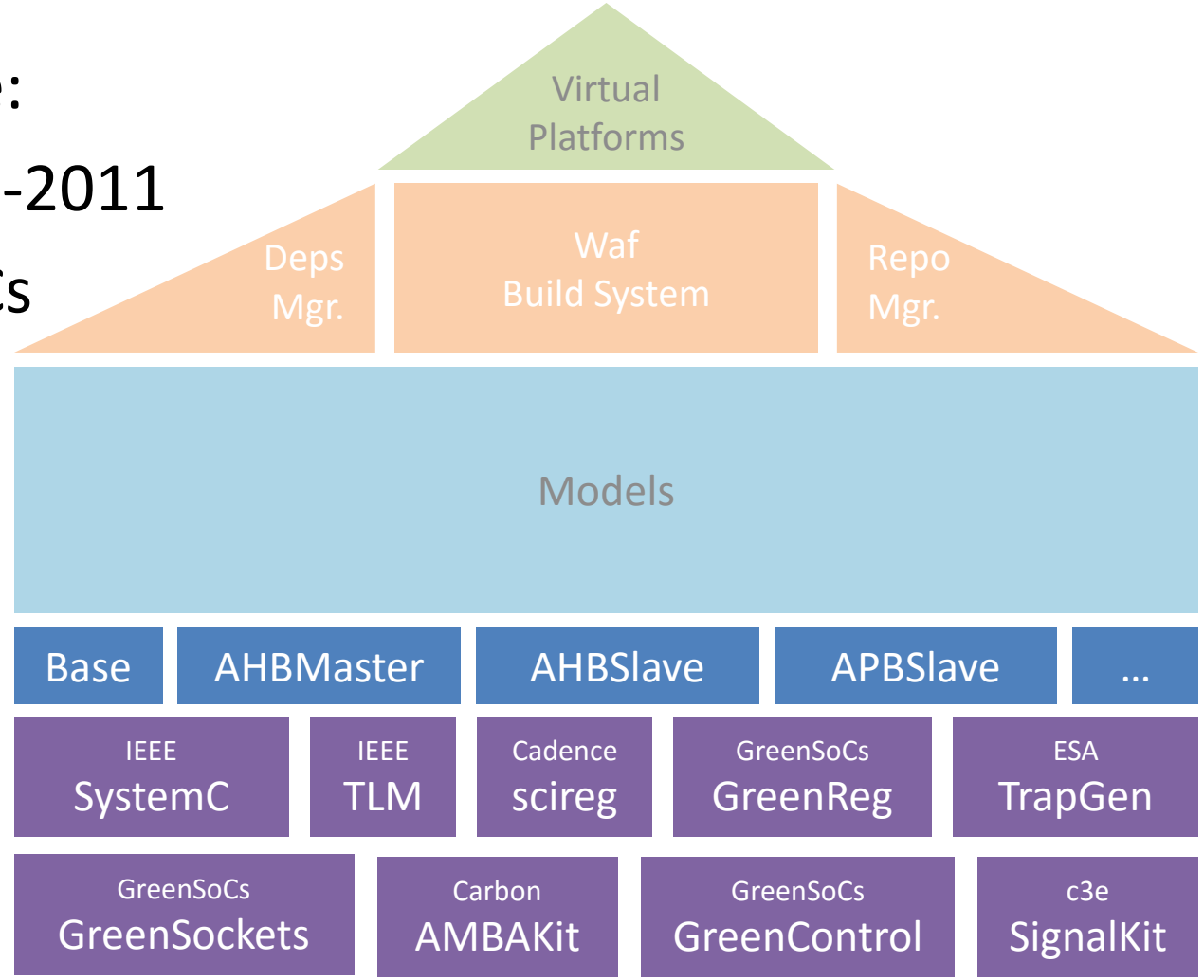
Desired implementation

- depends on the problem/programmer
- we propose Python for its usability

Common SystemC APIs

For example:

- IEEE 1666-2011
- GreenSoCs
- Cadence
- Carbon
- Own
- …



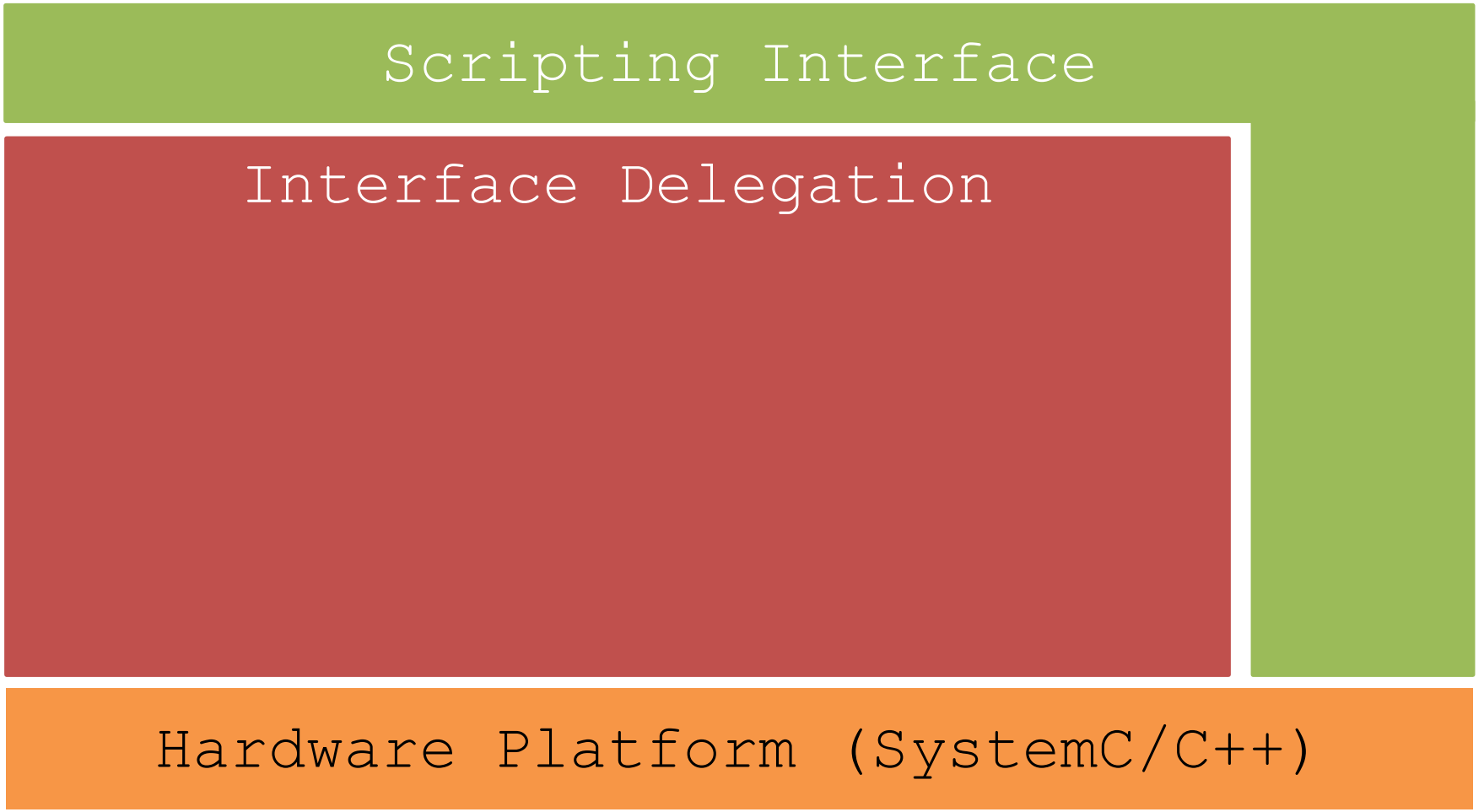
Additional requirements

- Available in multiple Simulators
- Language independent
- Same/similar APIs as in SystemC/C++

- Addressable via hierarchical module name

```
top.obj.reg
```

Environment



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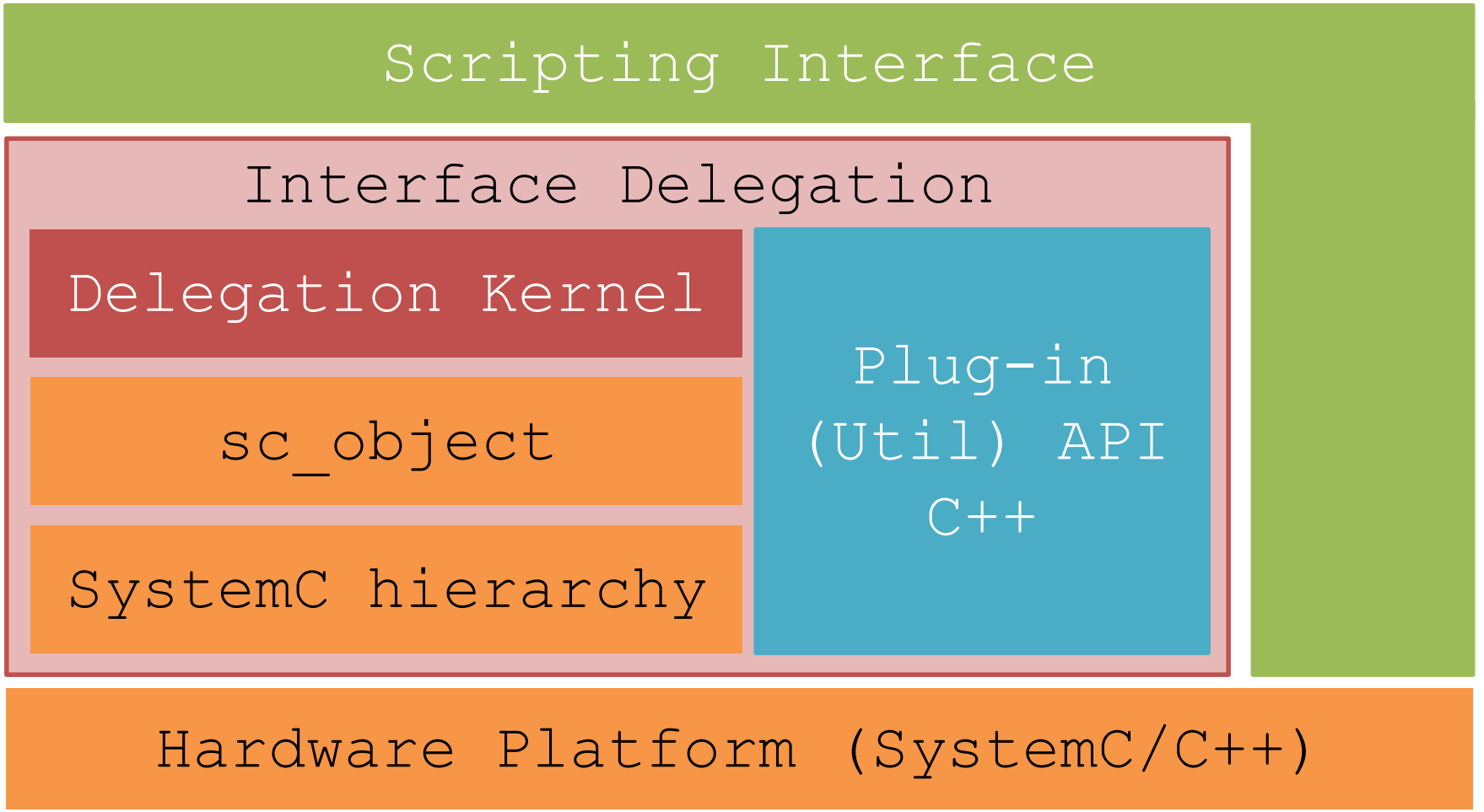
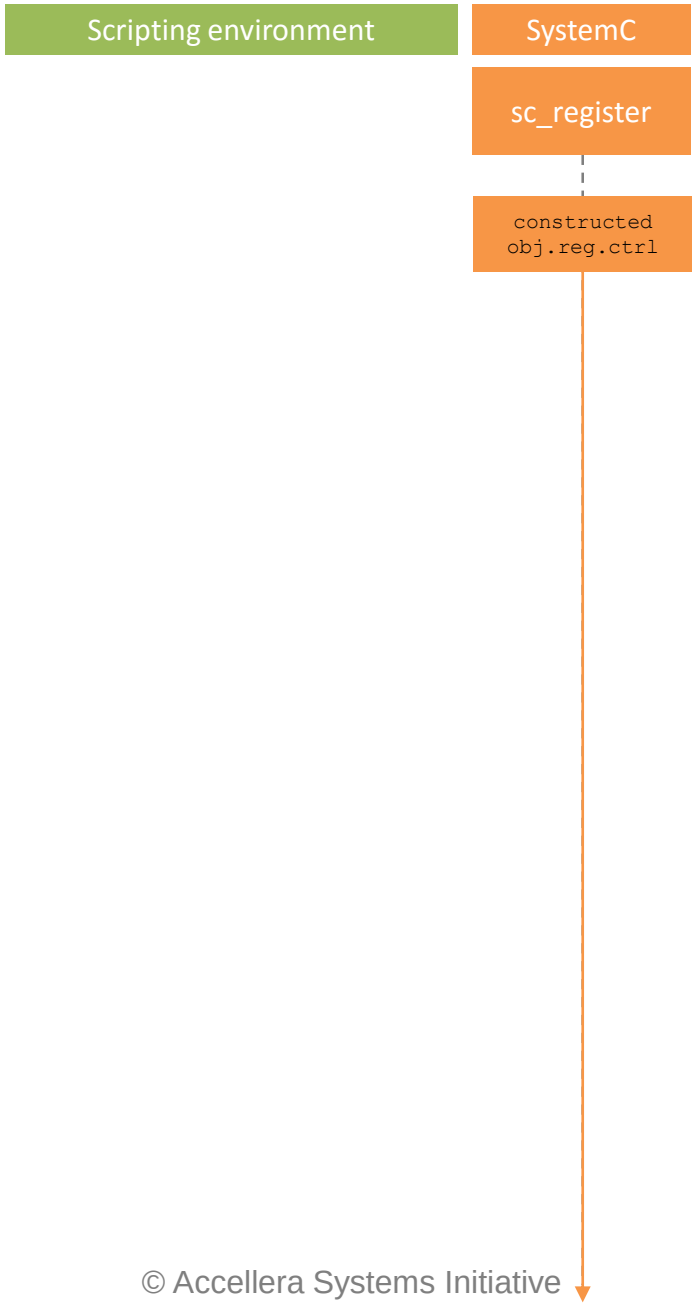
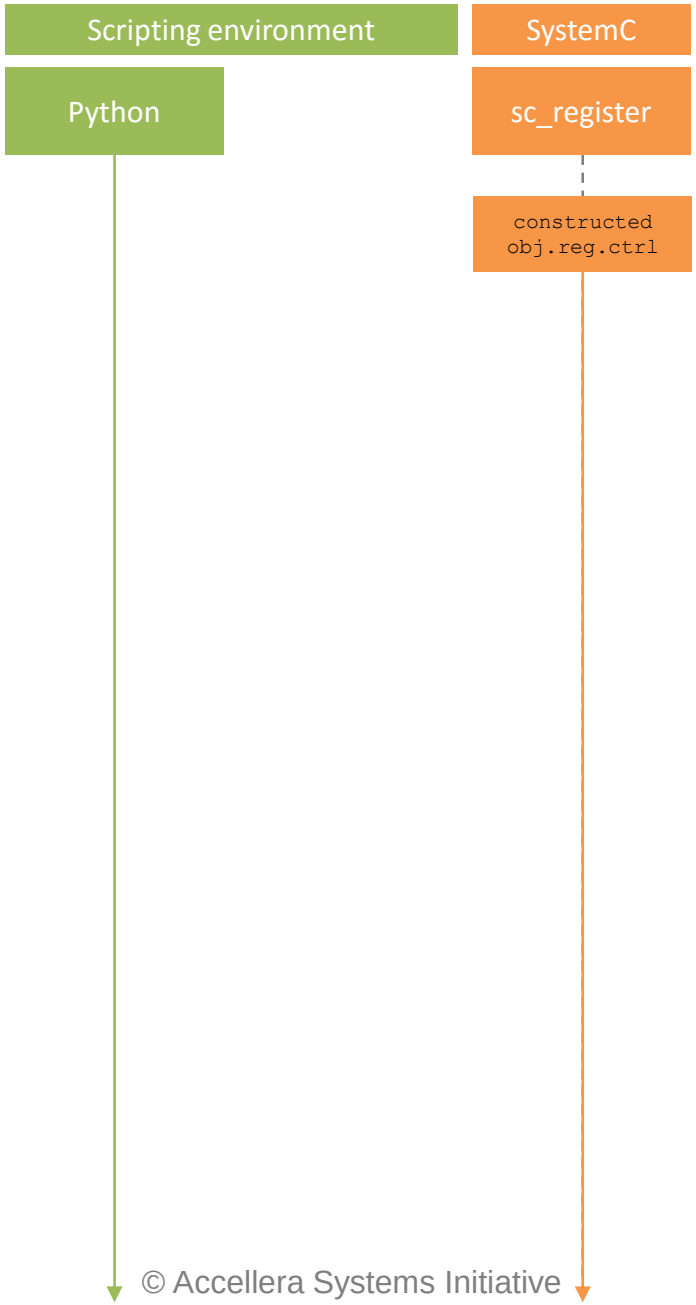
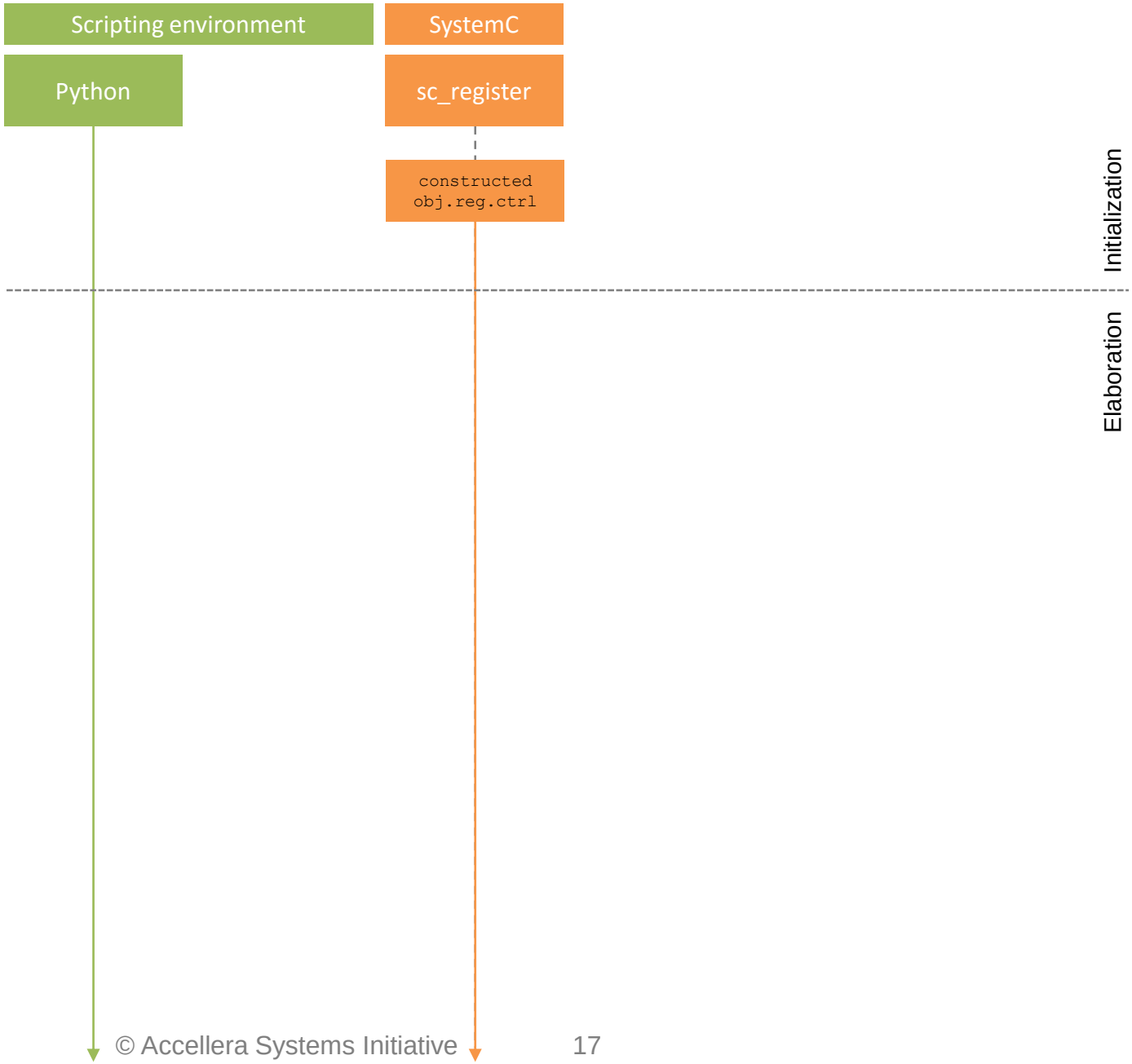


Scripting environment | SystemC


Scripting environment
SystemC
sc_register
constructed
obj.reg.ctrl

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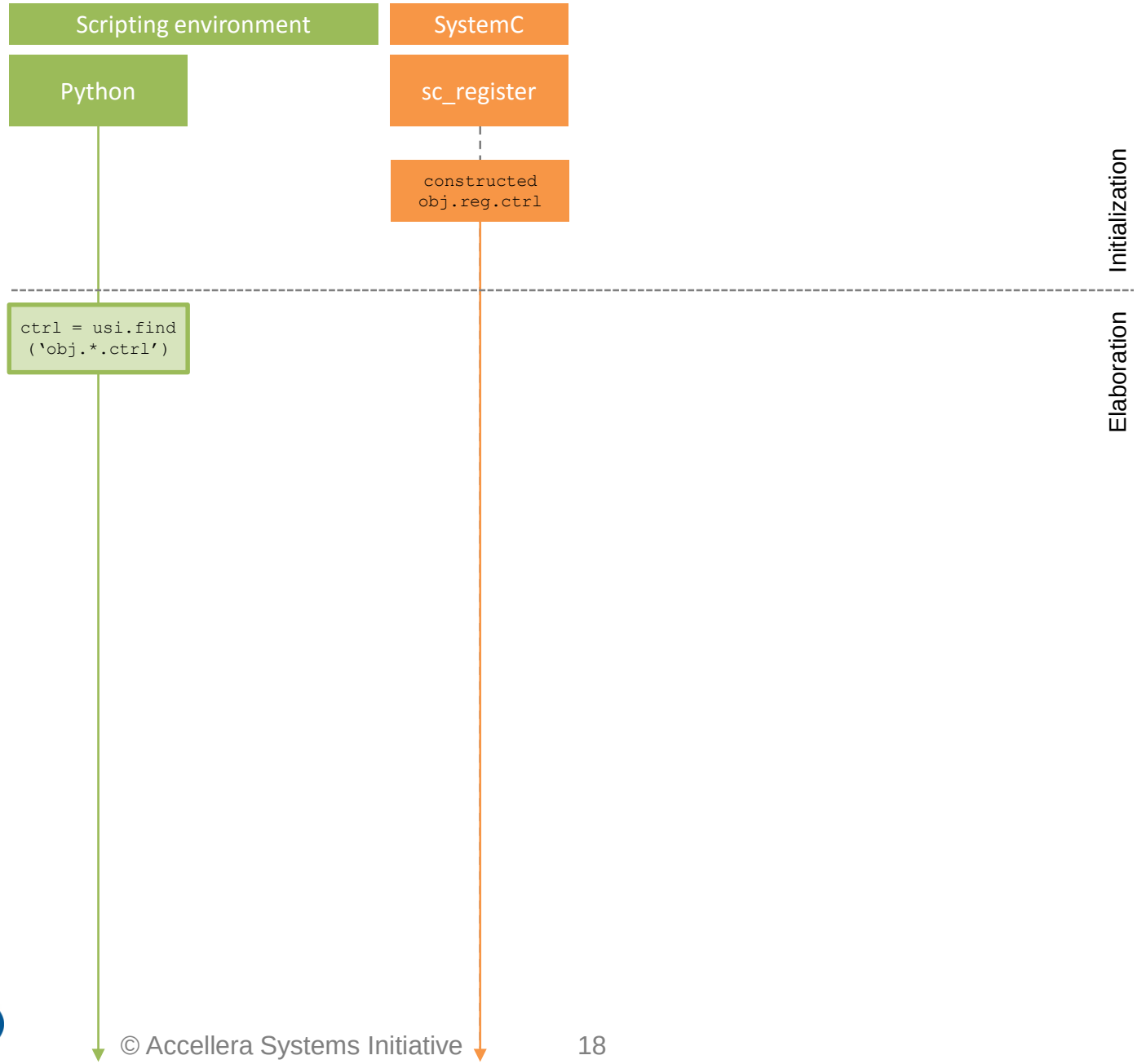
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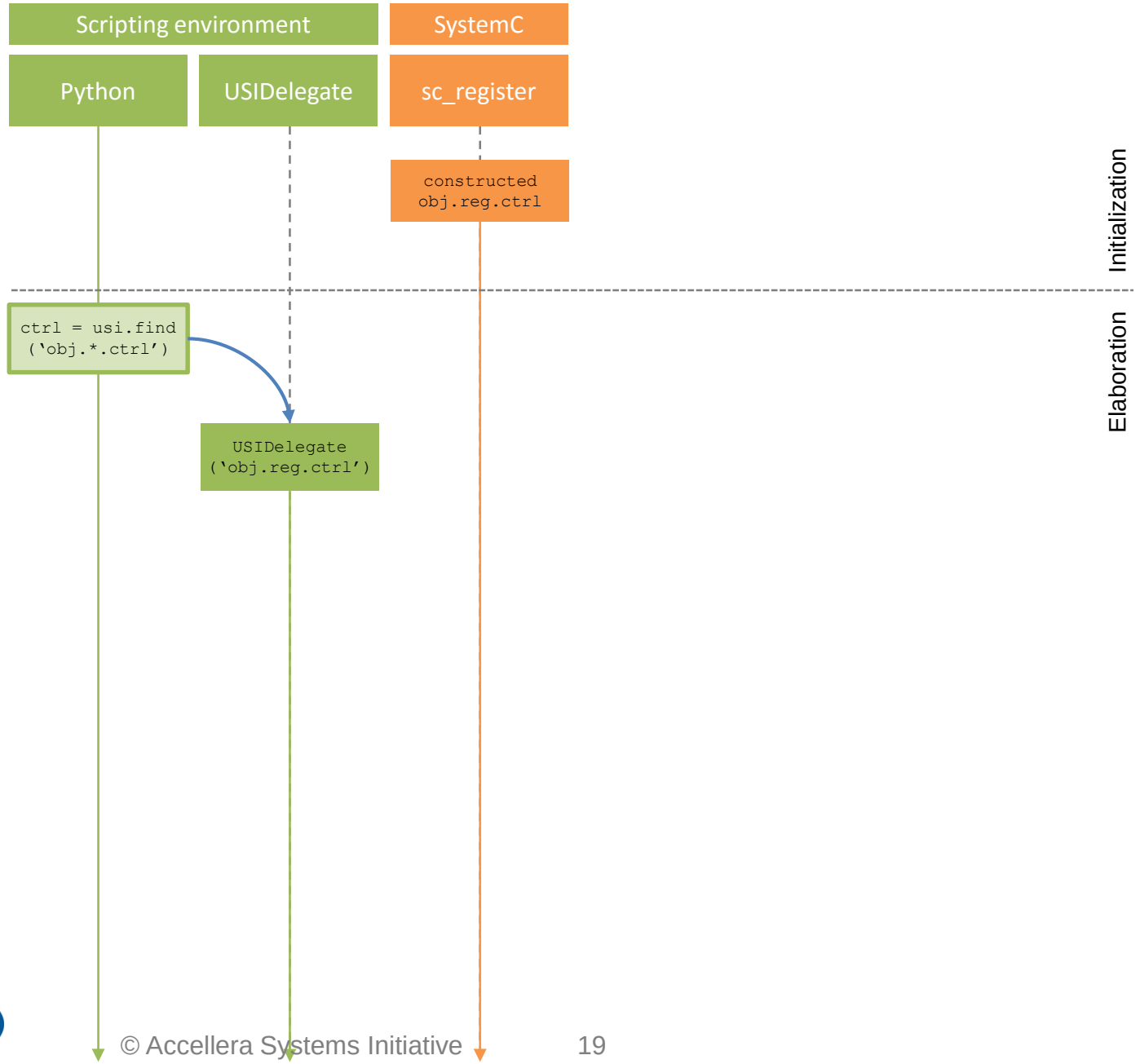
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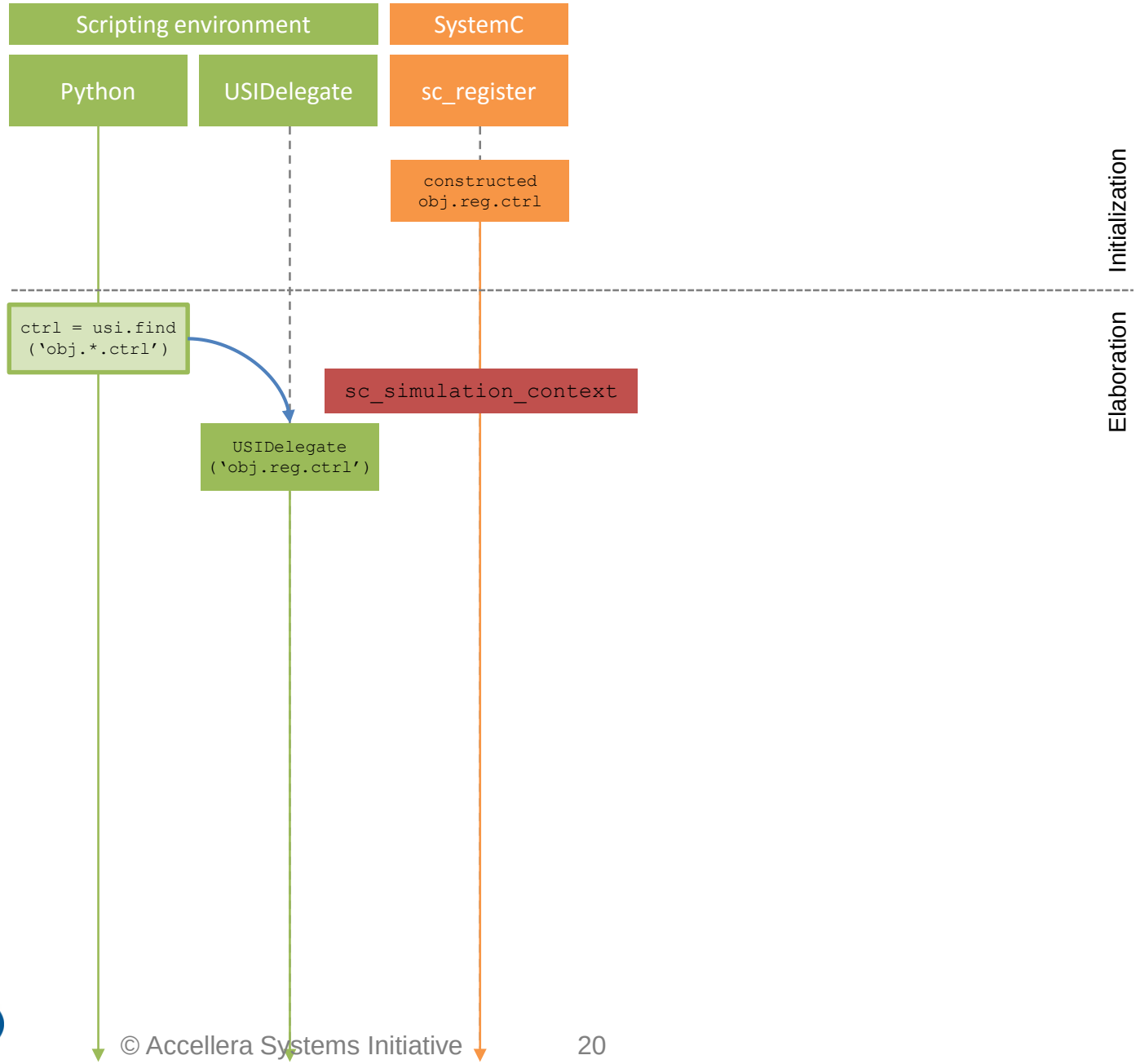
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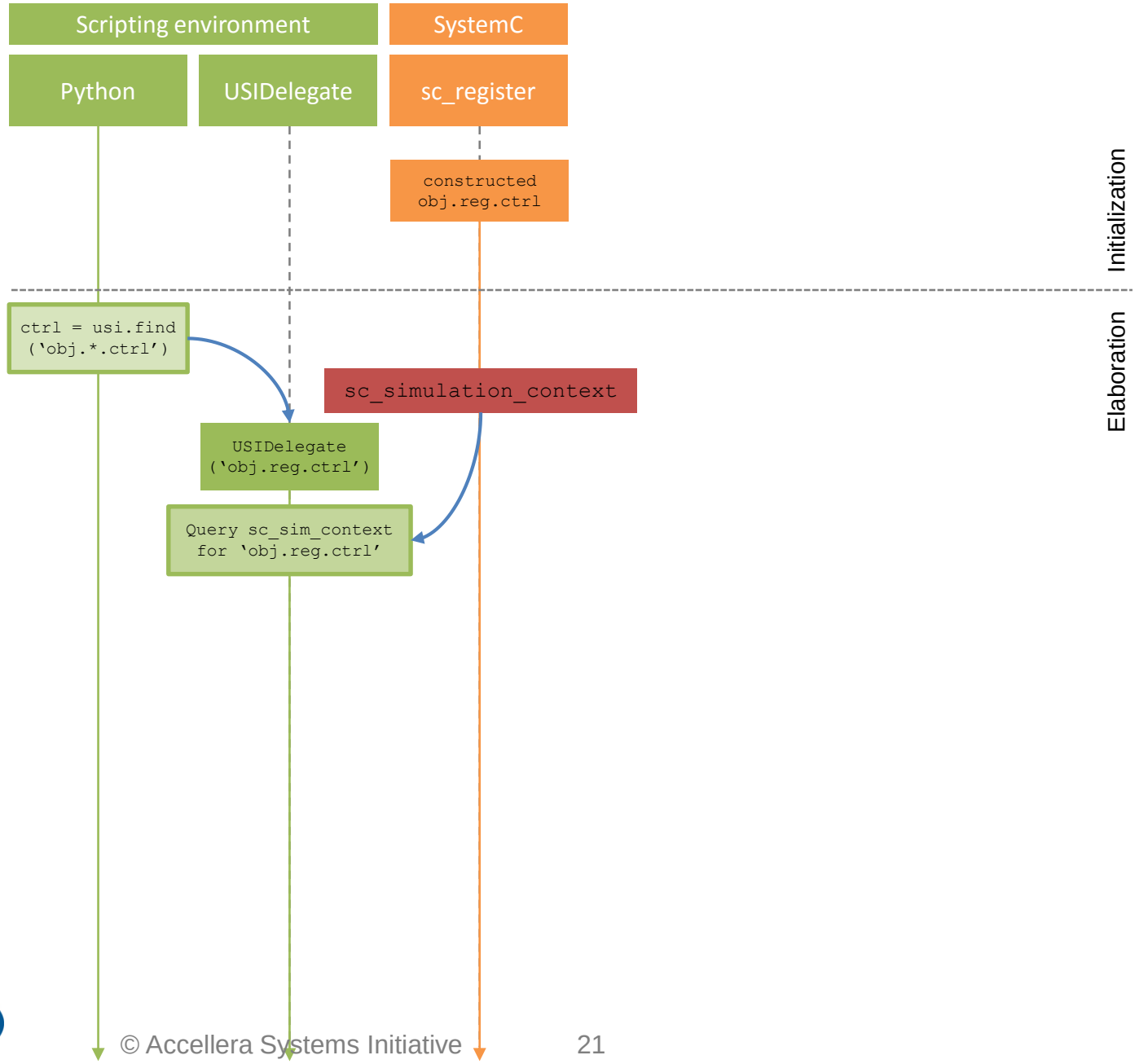
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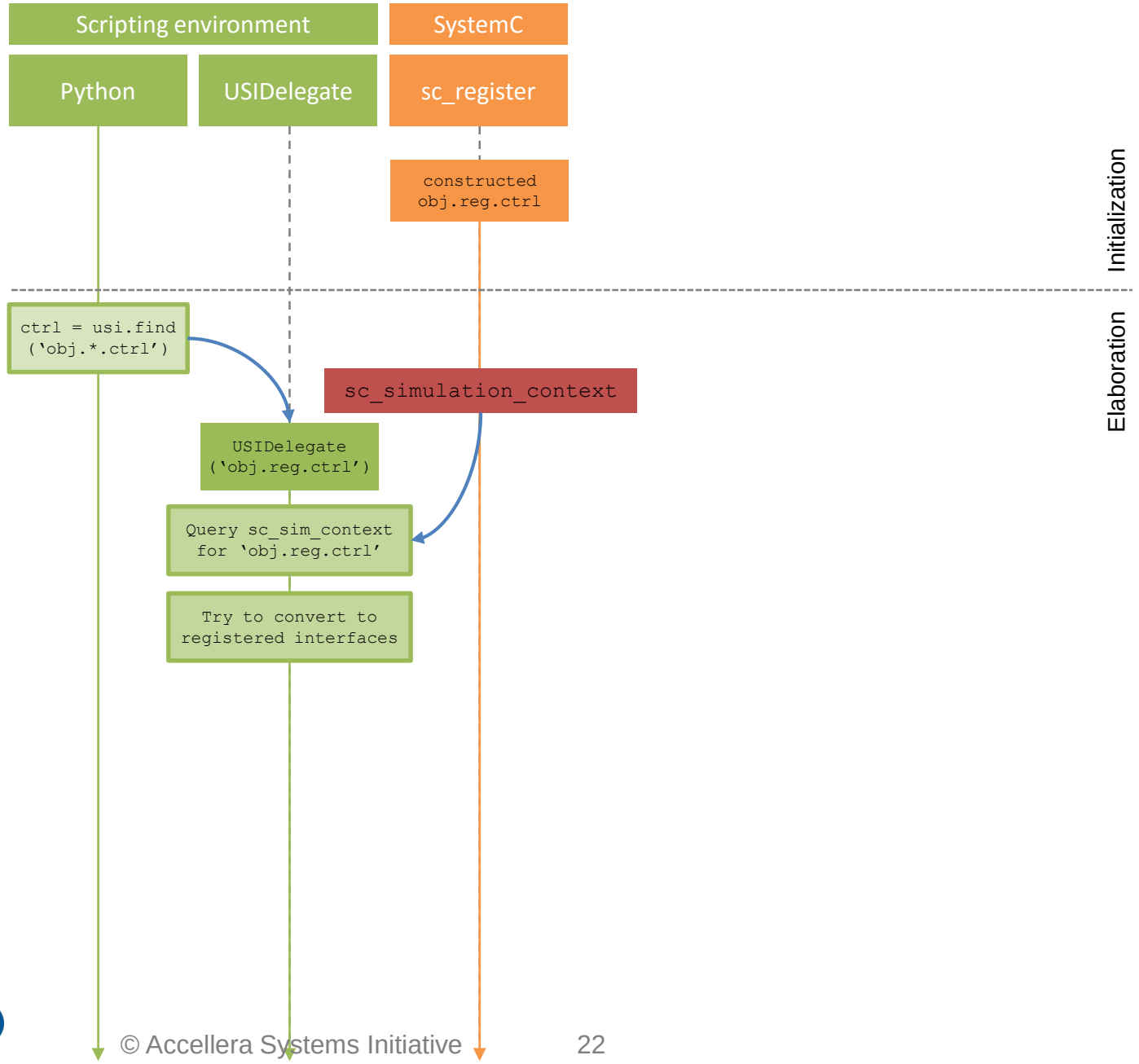
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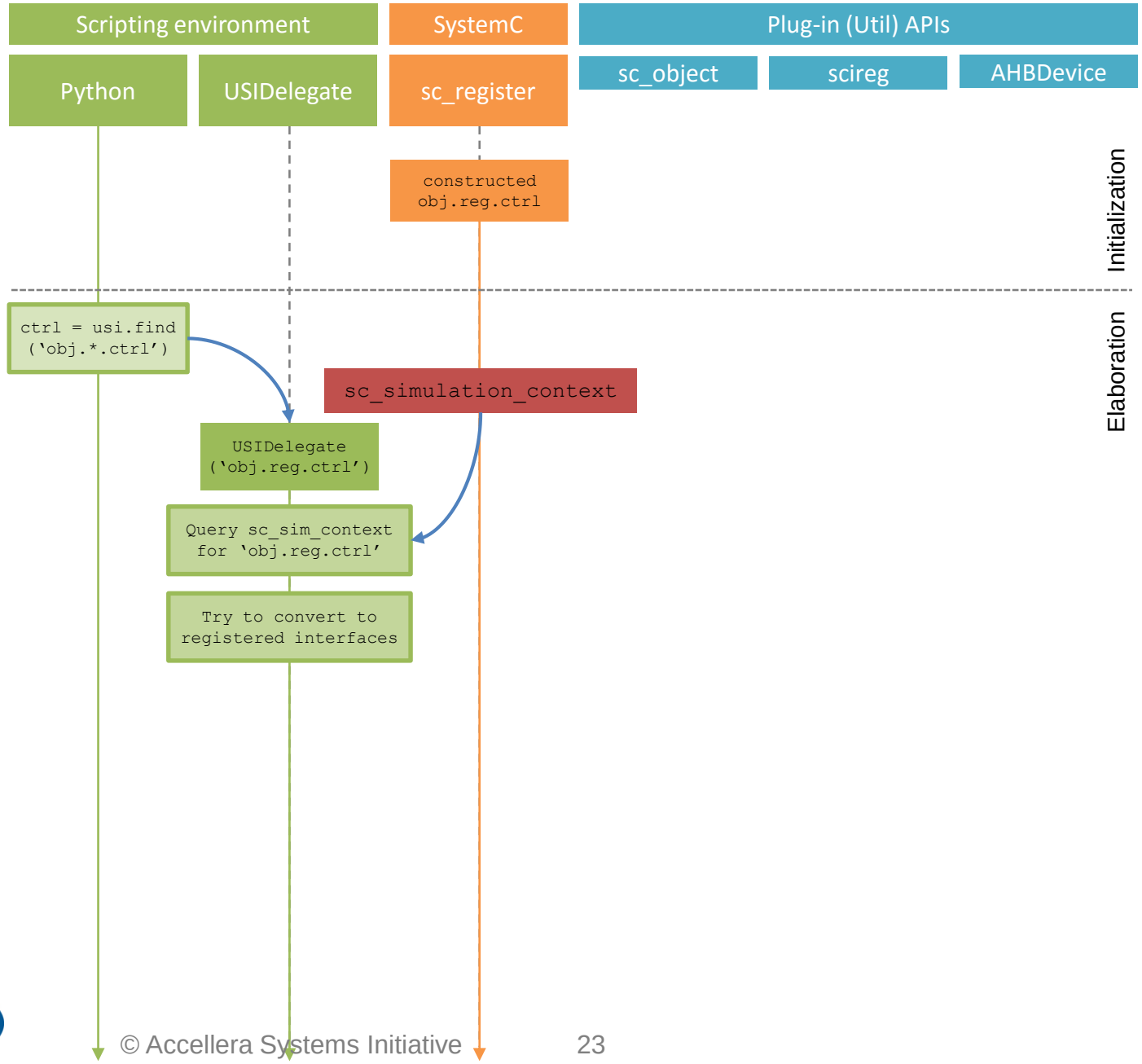
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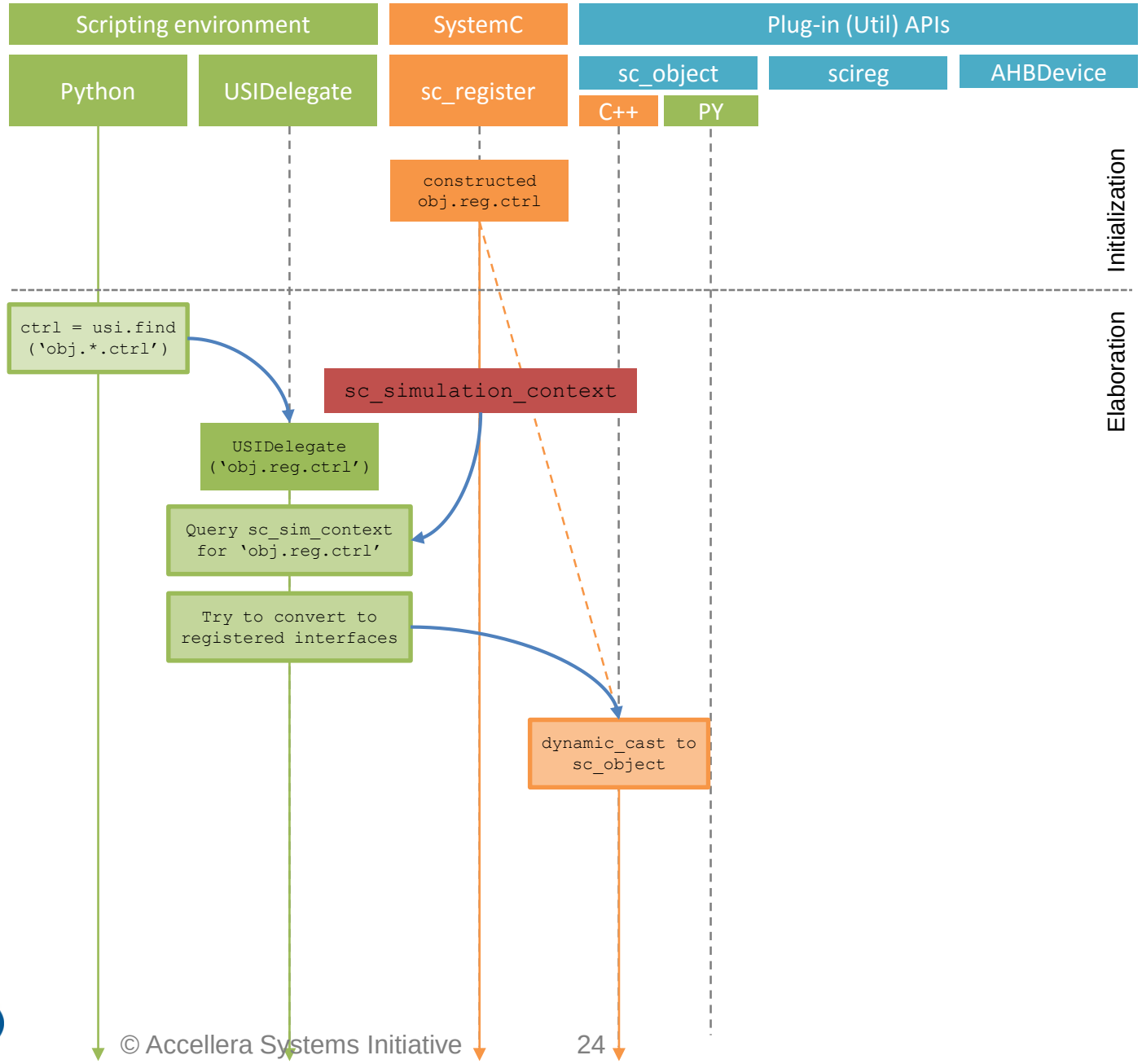
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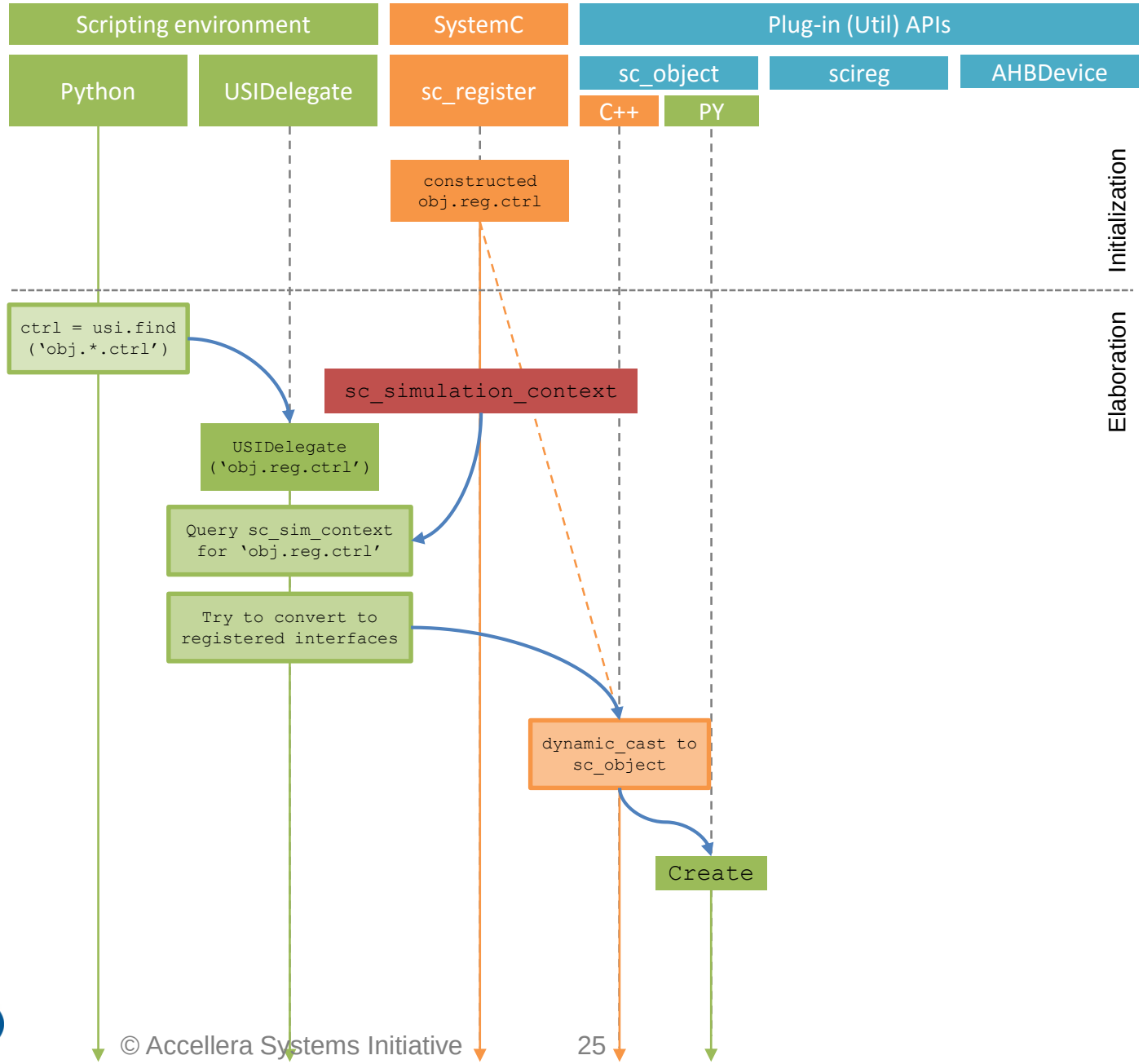
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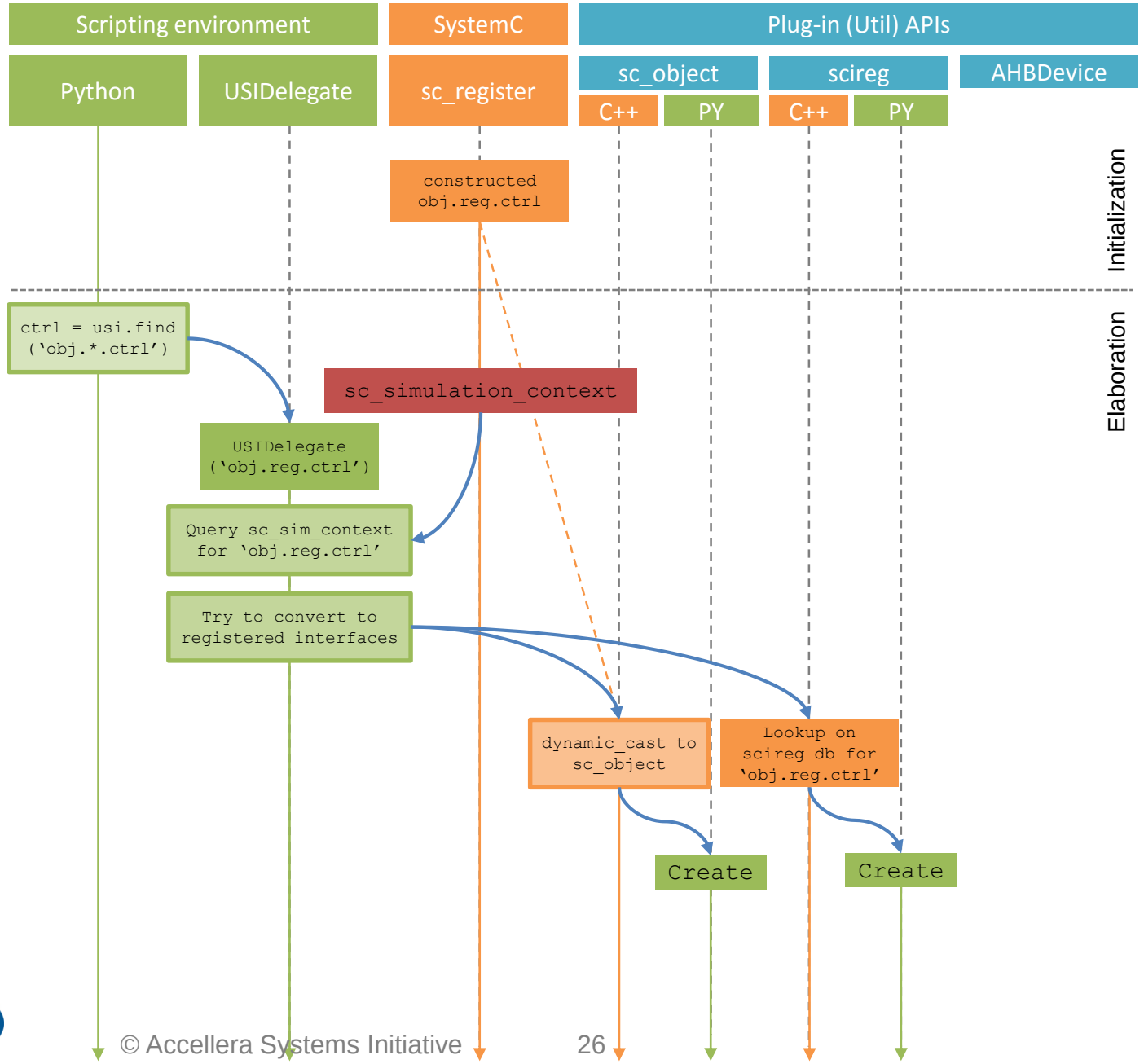
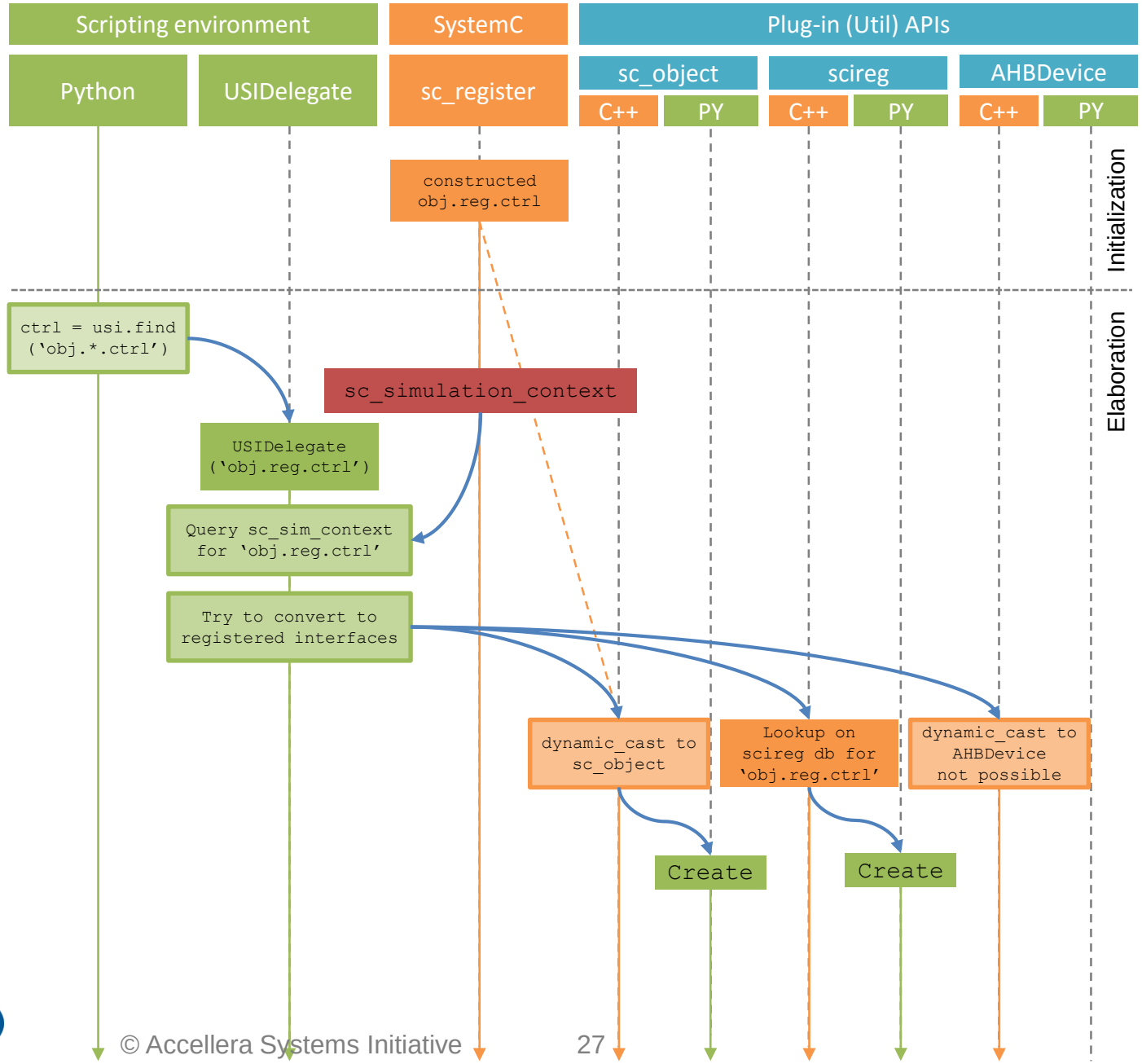
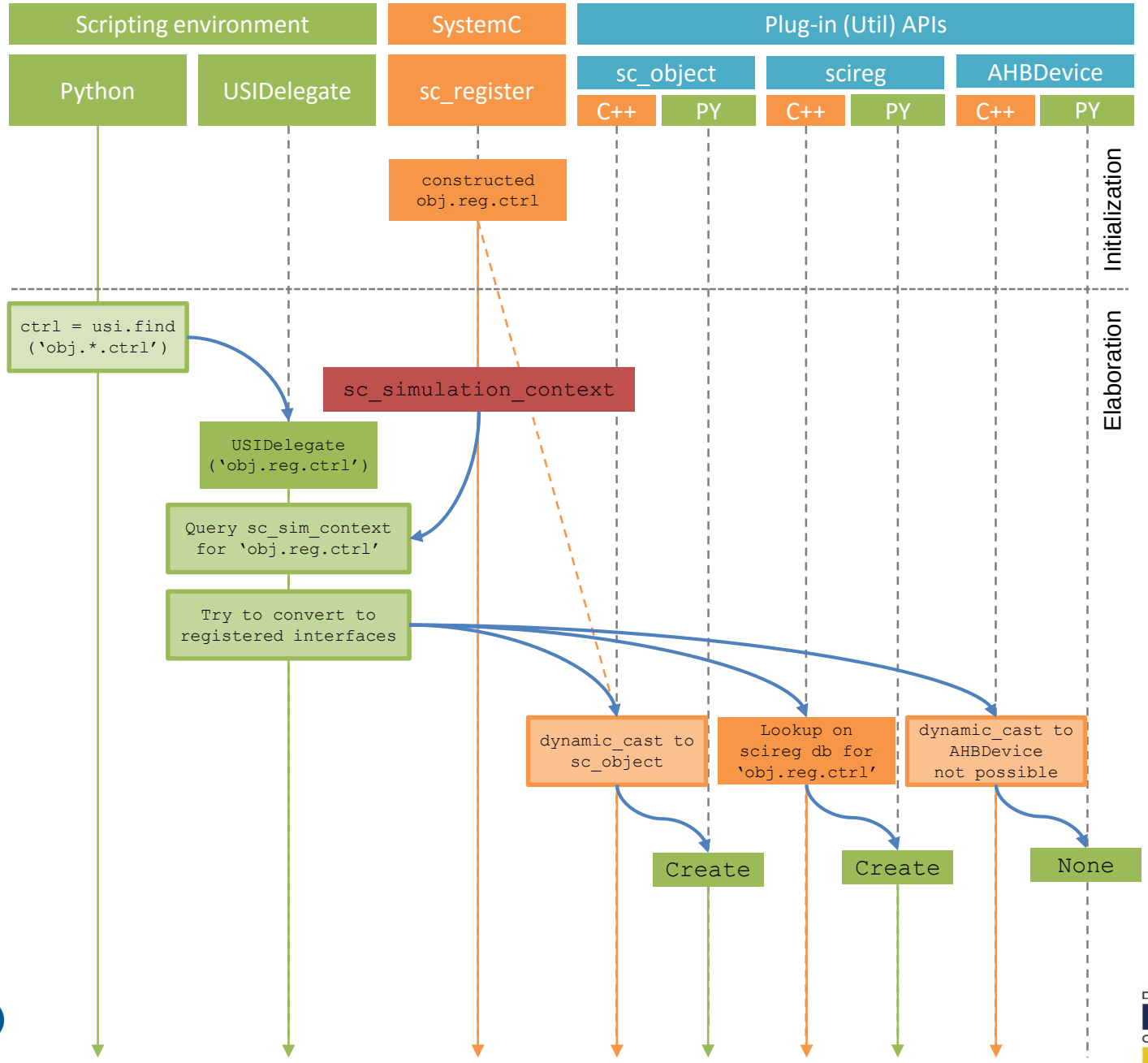
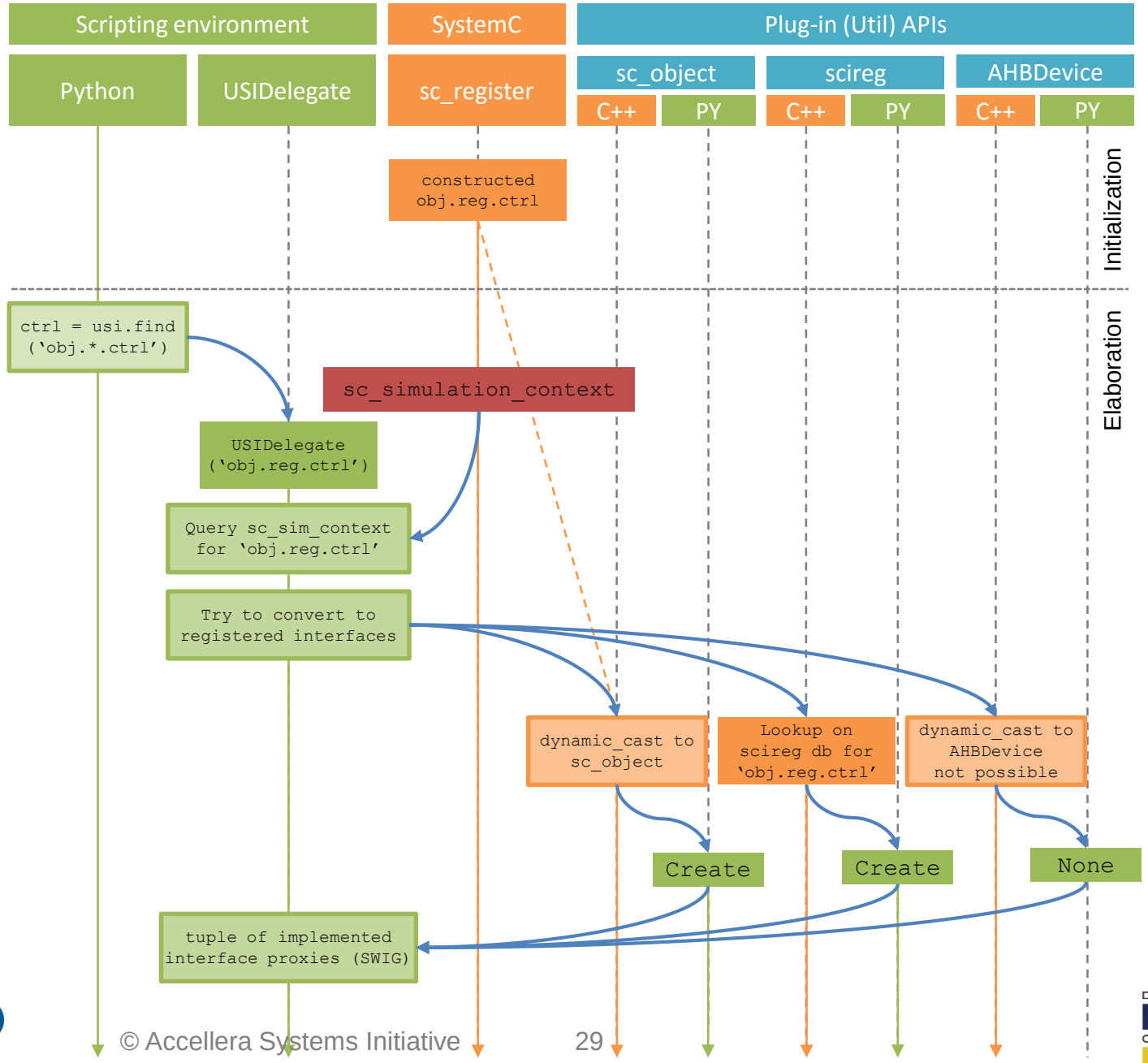


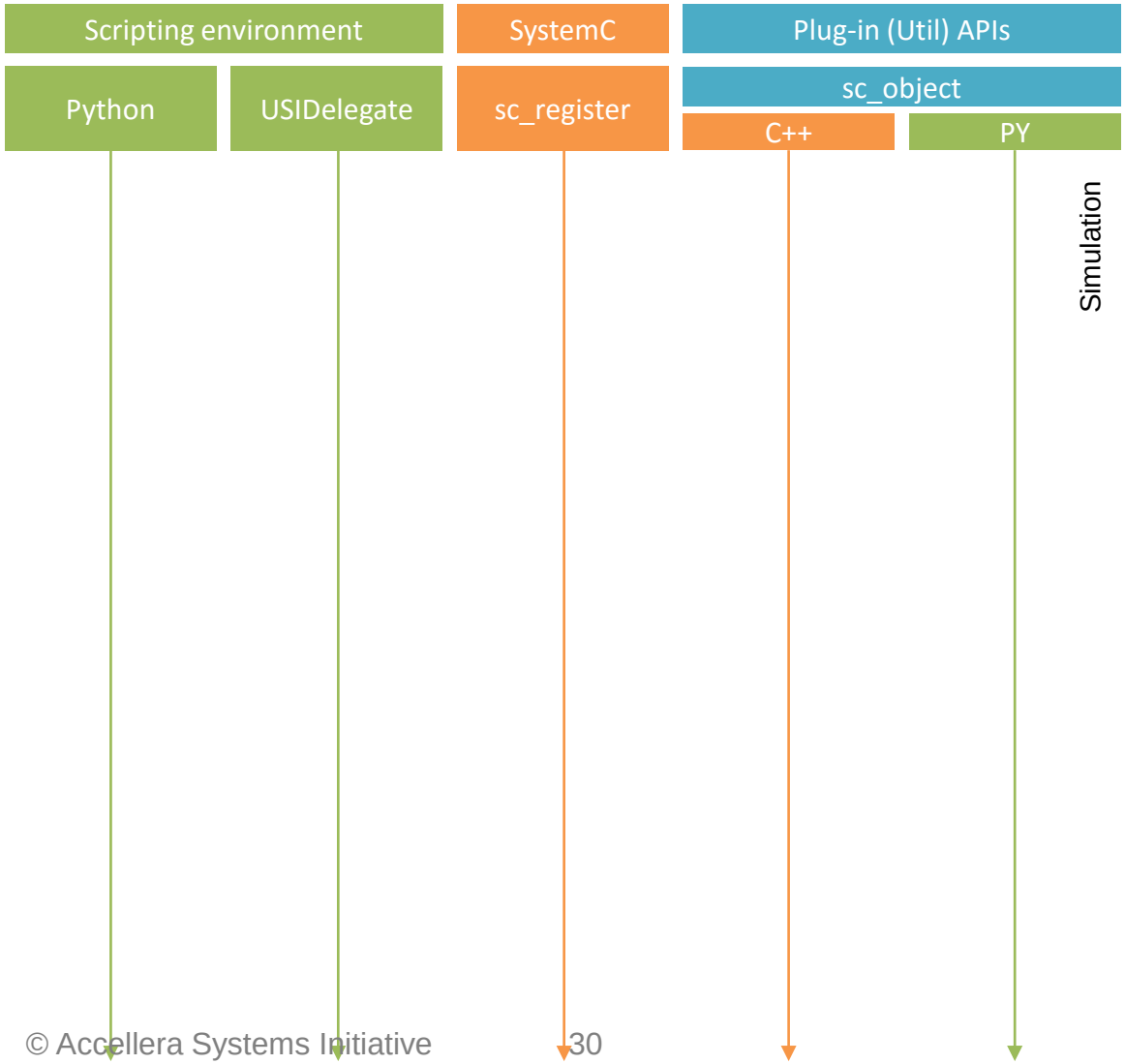






Plugin function call

Or how to access simulation information via interface delegation



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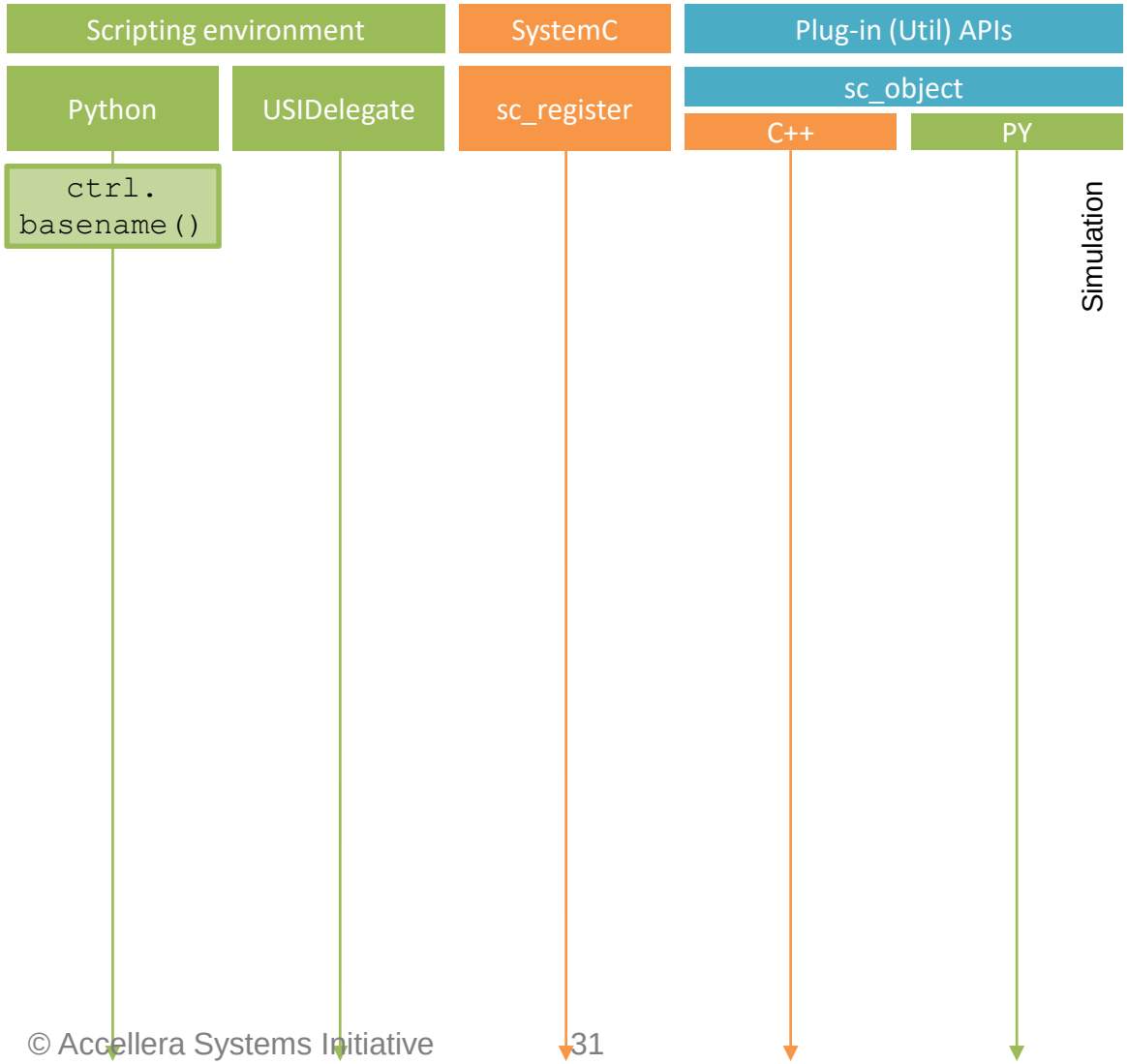

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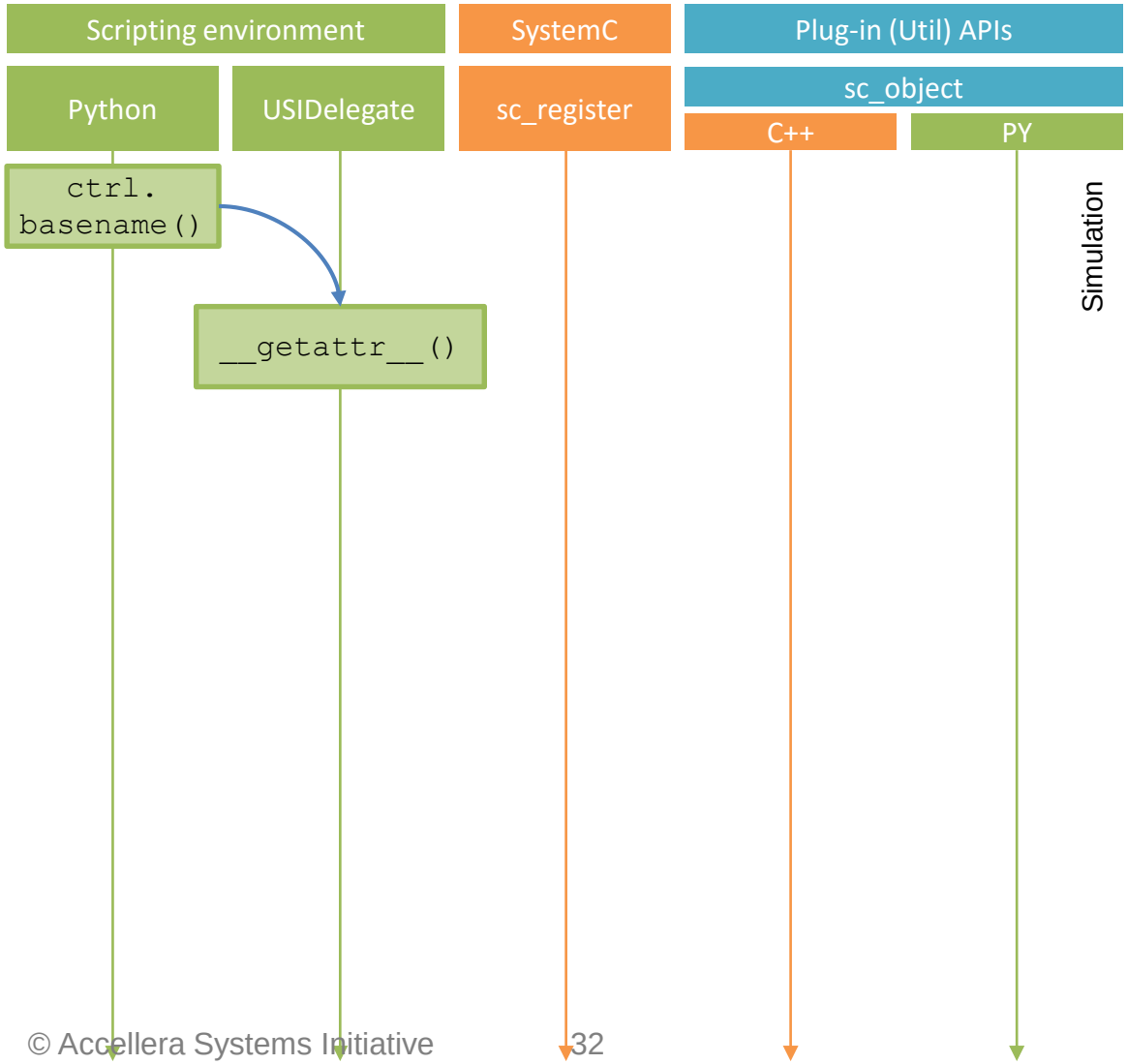

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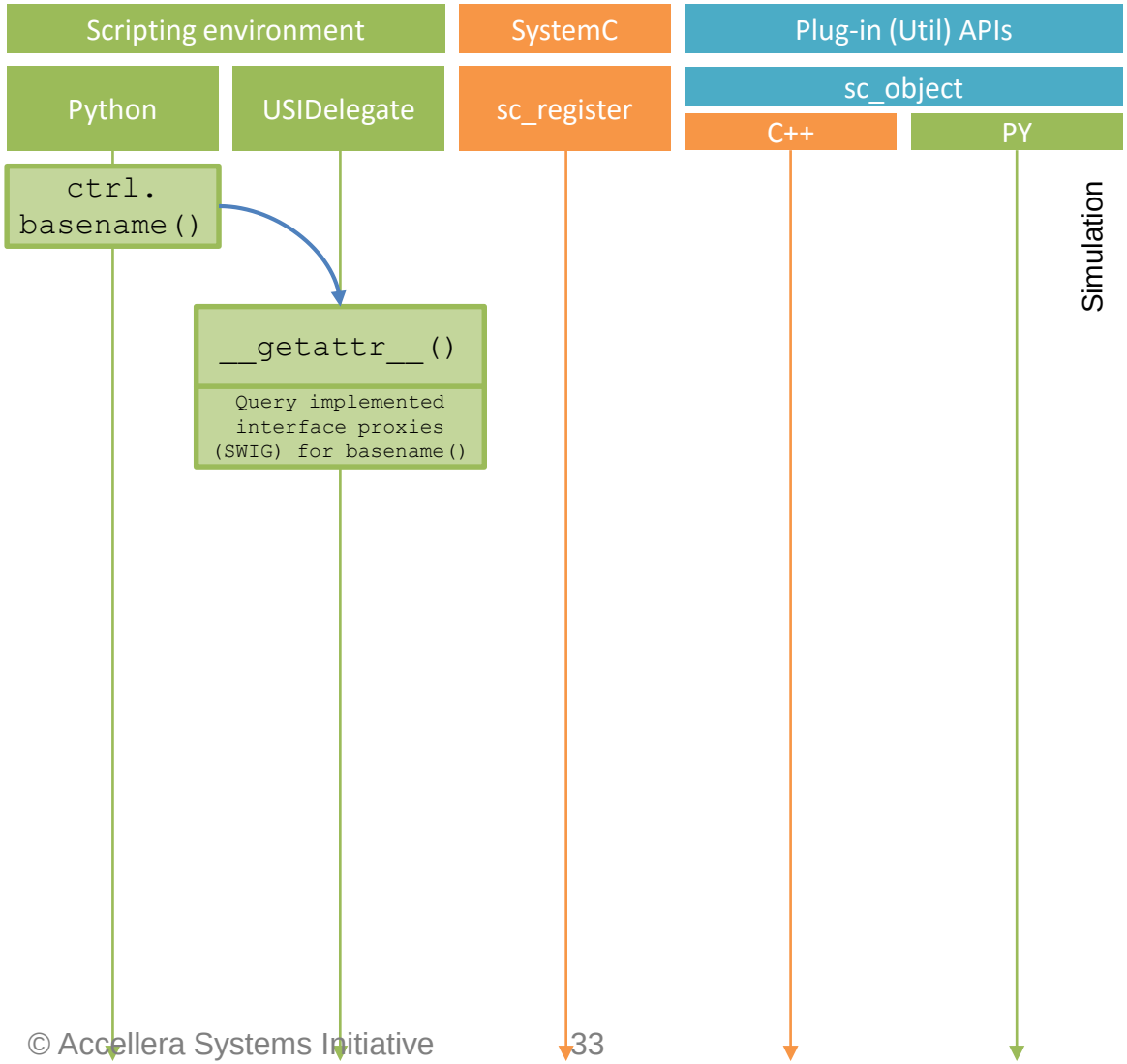

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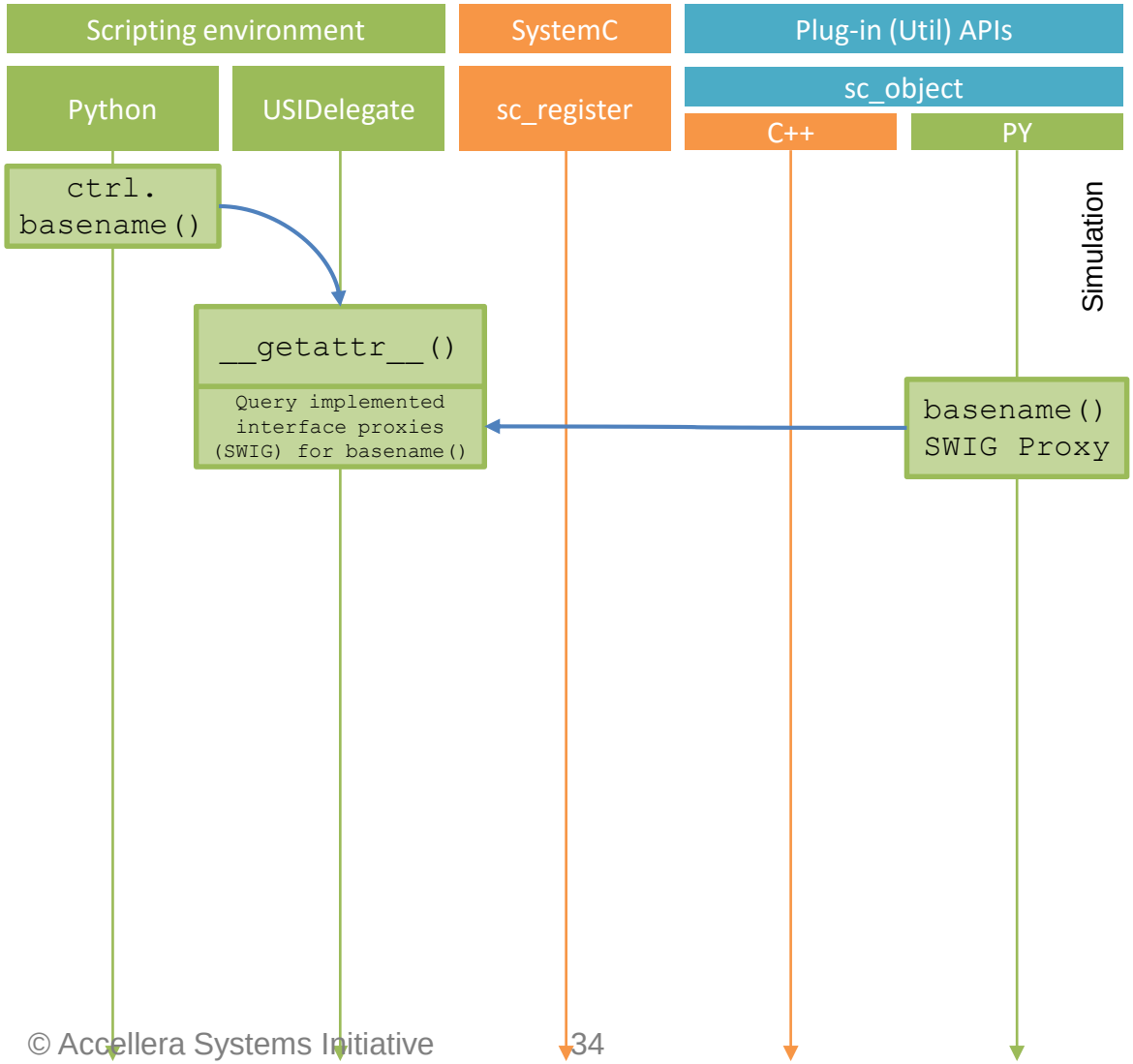

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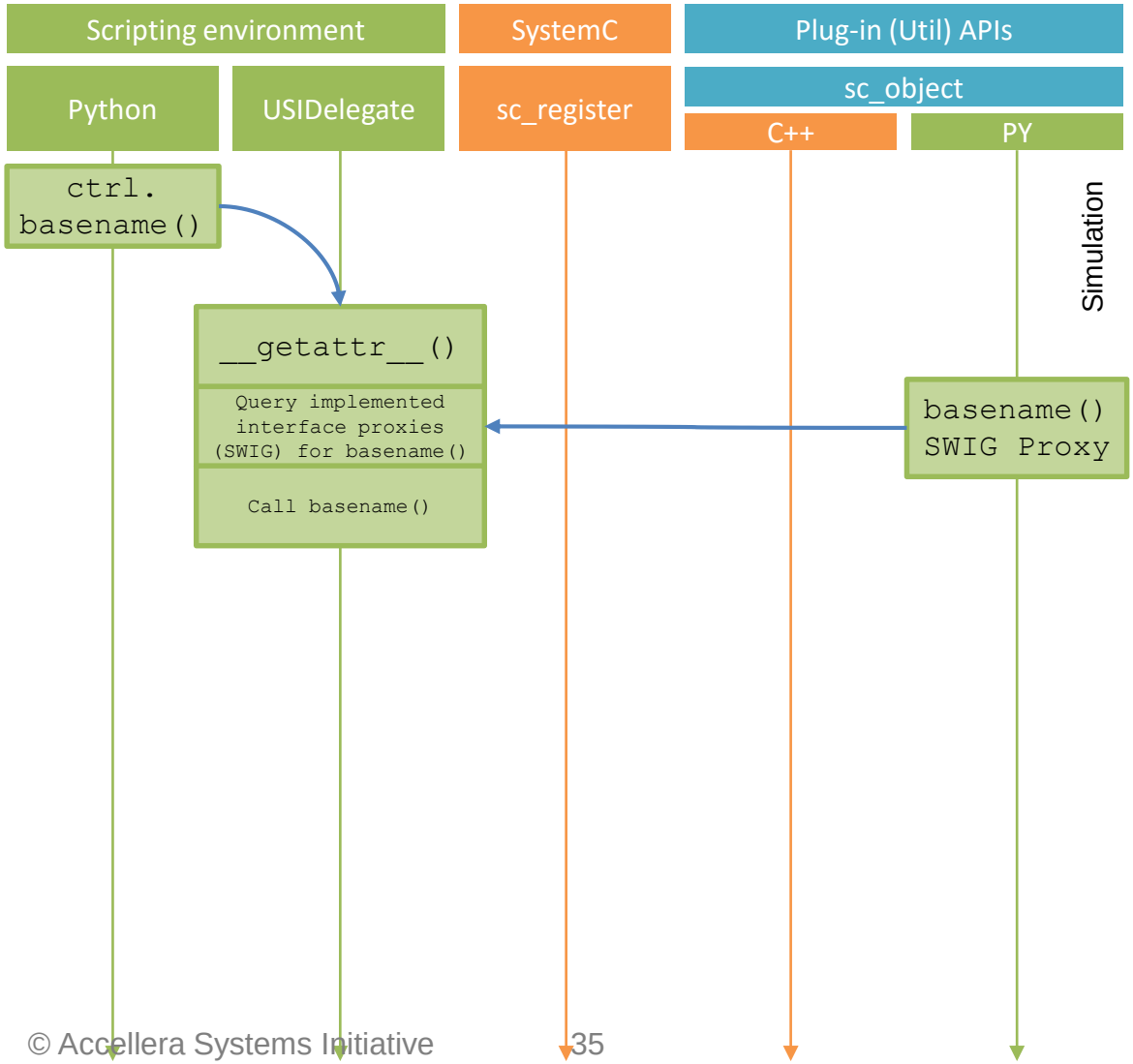

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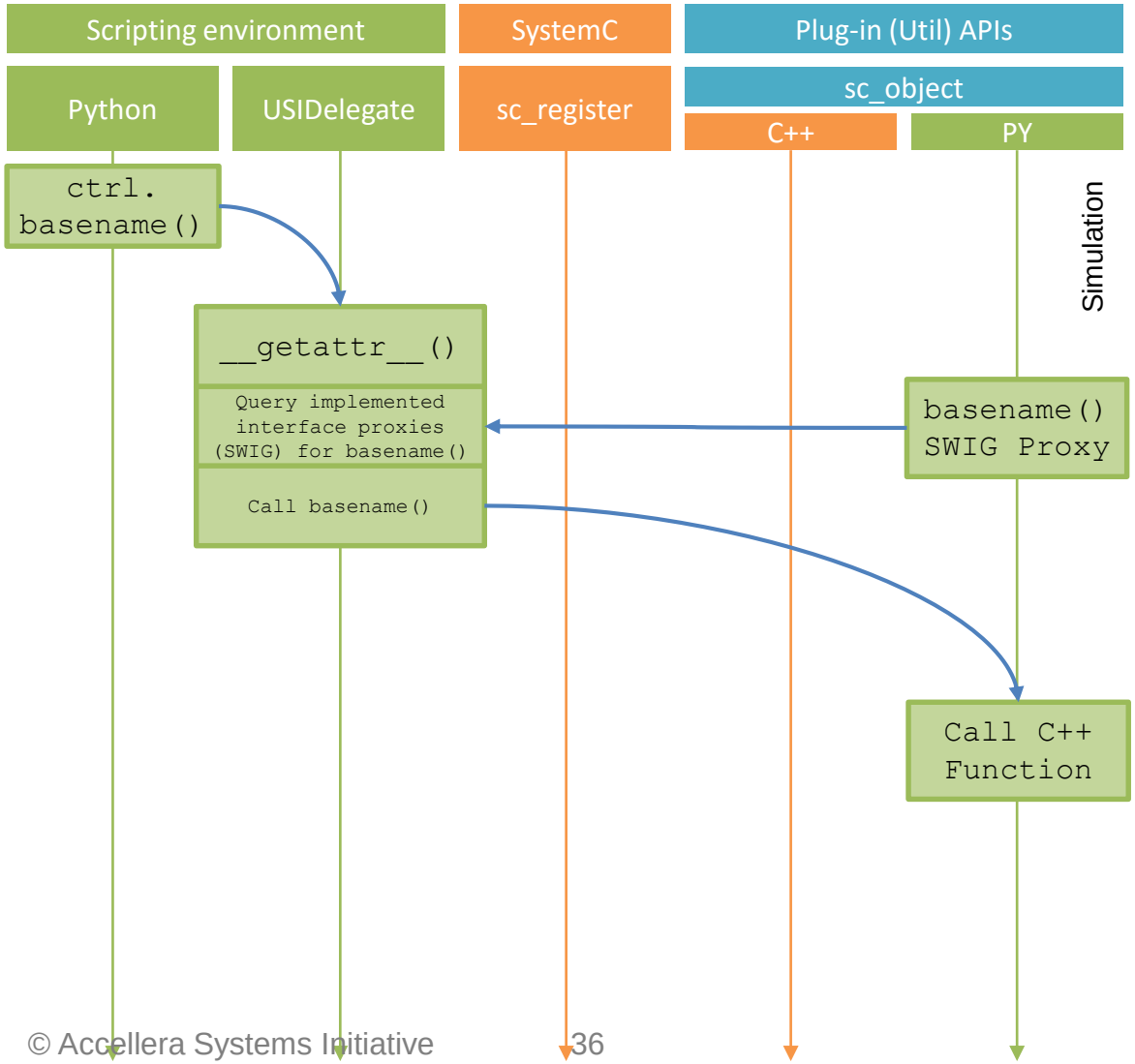

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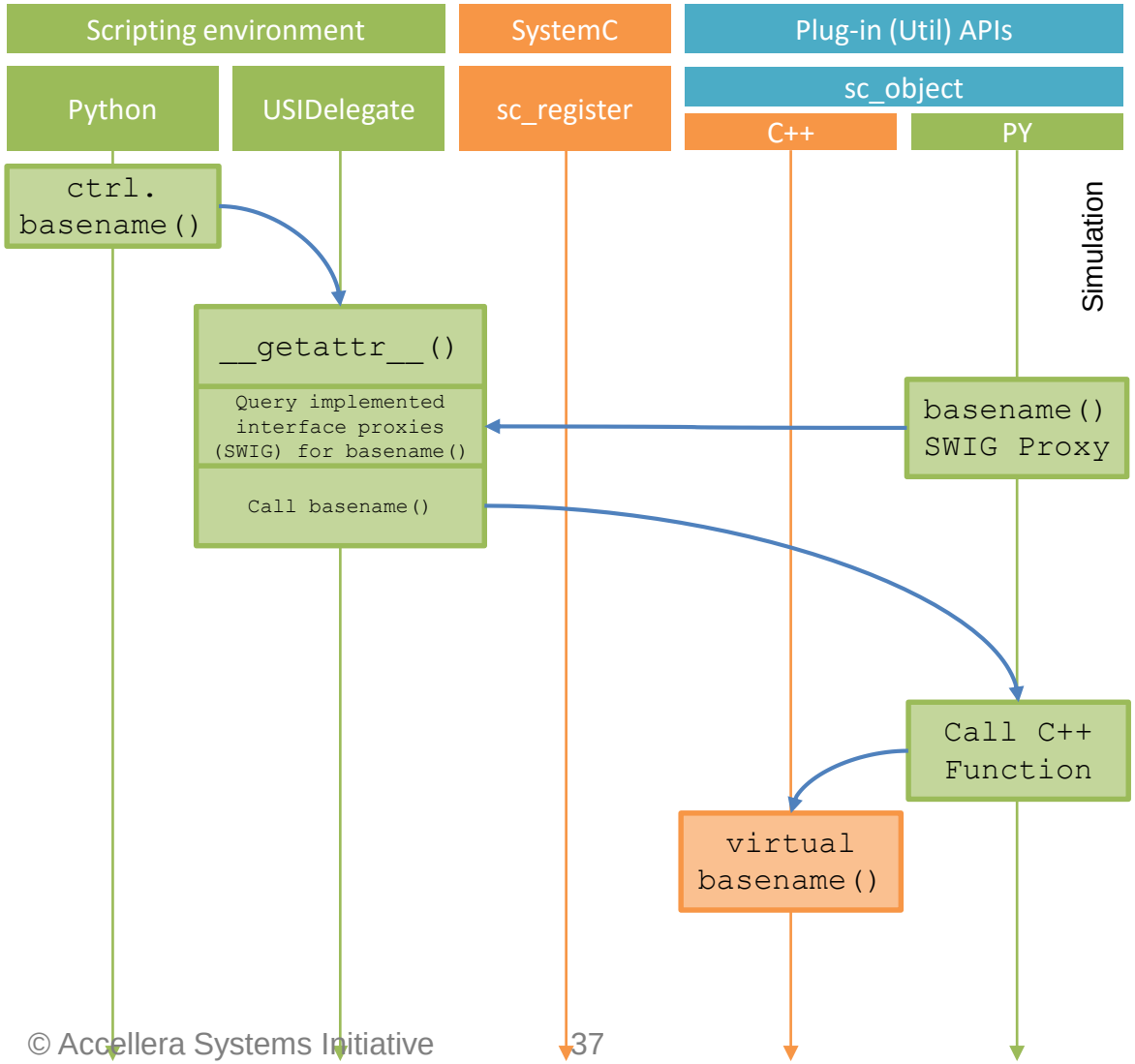

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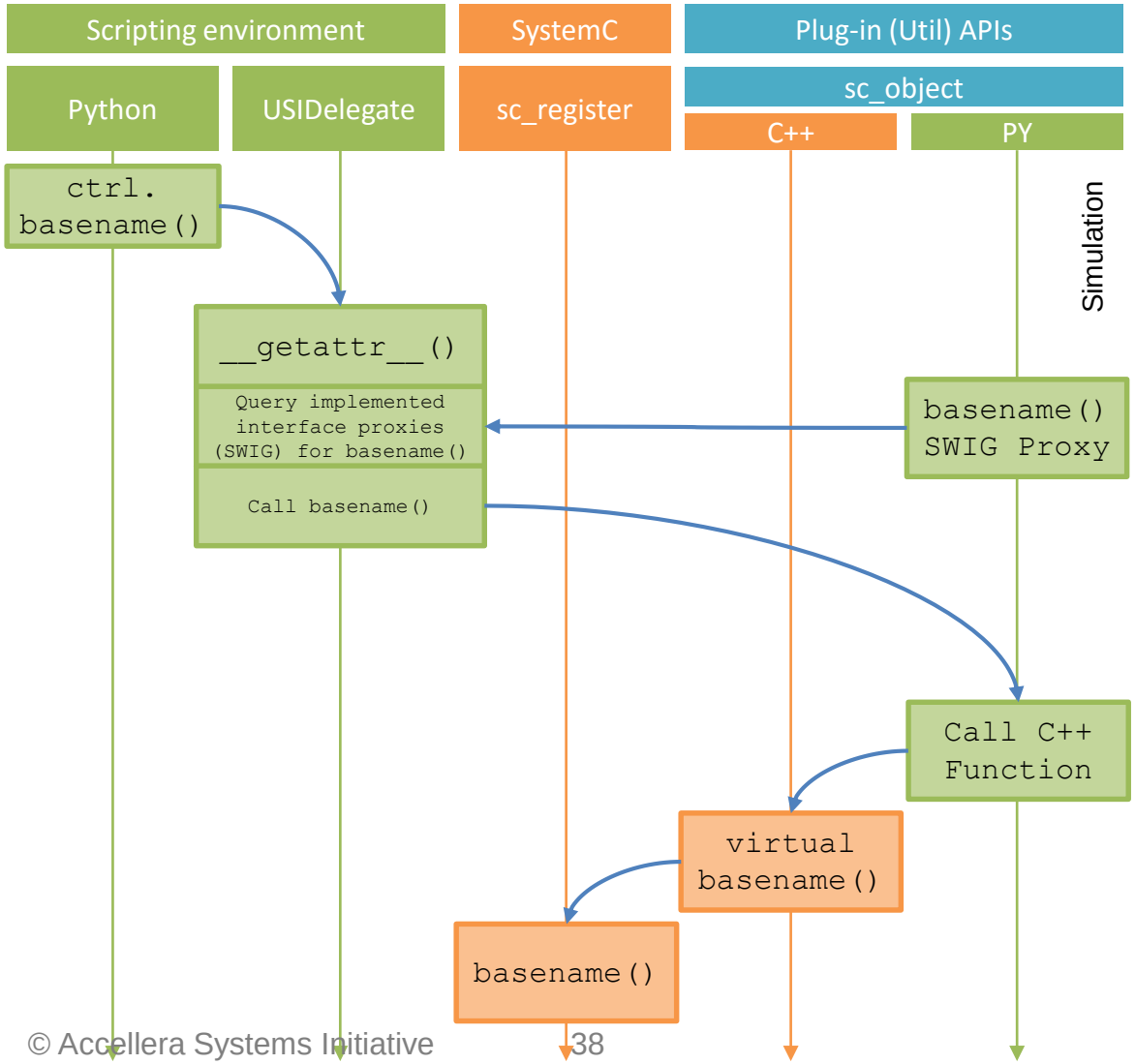

Simulator agnostic

- ✓ Accellera SystemC
- ✓ Mentor Graphics Questasim
  - No sc_main
  - Introduction of a help macro
  - USI_MODEL_EXPORT
  - GCC 32 bit
  - Debugging problems
  - Potential for deeper integration

Language agnostic

- ✓ TCL
- ✓ Ruby
- ✓ Python
- ○ Lua

API agnostic

- ✓ sc_object, tlm_socket
- ✓ GreenControl gs_param
- ✓ Cadence scireg
- ✓ AHB/APBDevice

Usability vs. Speed

- Easier to write
- Faster prototyping
- Domain Specific
  - Statistics
  - Text processing

- Slower (Python: 10 to 100 times)
- Fast extensions available (e.g. Python pandas)
- Ideal for pre-/post processing and glue

SoCRocket is available online: https://socrocket.github.io/

For more information please contact us!

Questions