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MetaPSS: An Automation Framework for Generation of Portable Stimulus Model

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accellera SYSTEMS INITIATIVE

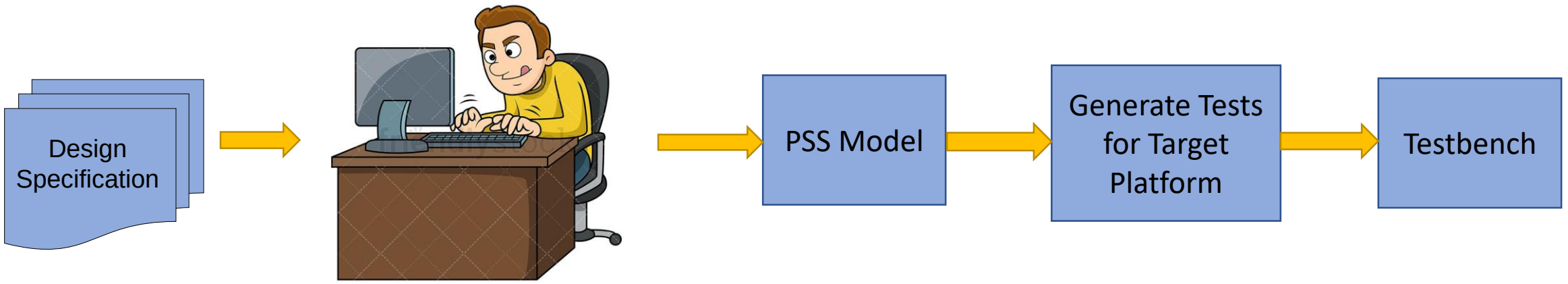
Agenda

- Introduction
- Model-driven PSS generation flow
- Code Generation
- Conclusion

Introduction

- Portable stimulus model is a single representation of stimulus and test scenarios usable across many levels of integration
- A well-defined meta-model based framework for automated generation of portable stimulus representation
- Inspired from Model-Driven-Architecture (MDA) principle for the code generation
- Meta-model is visually symbolized with UML class diagram

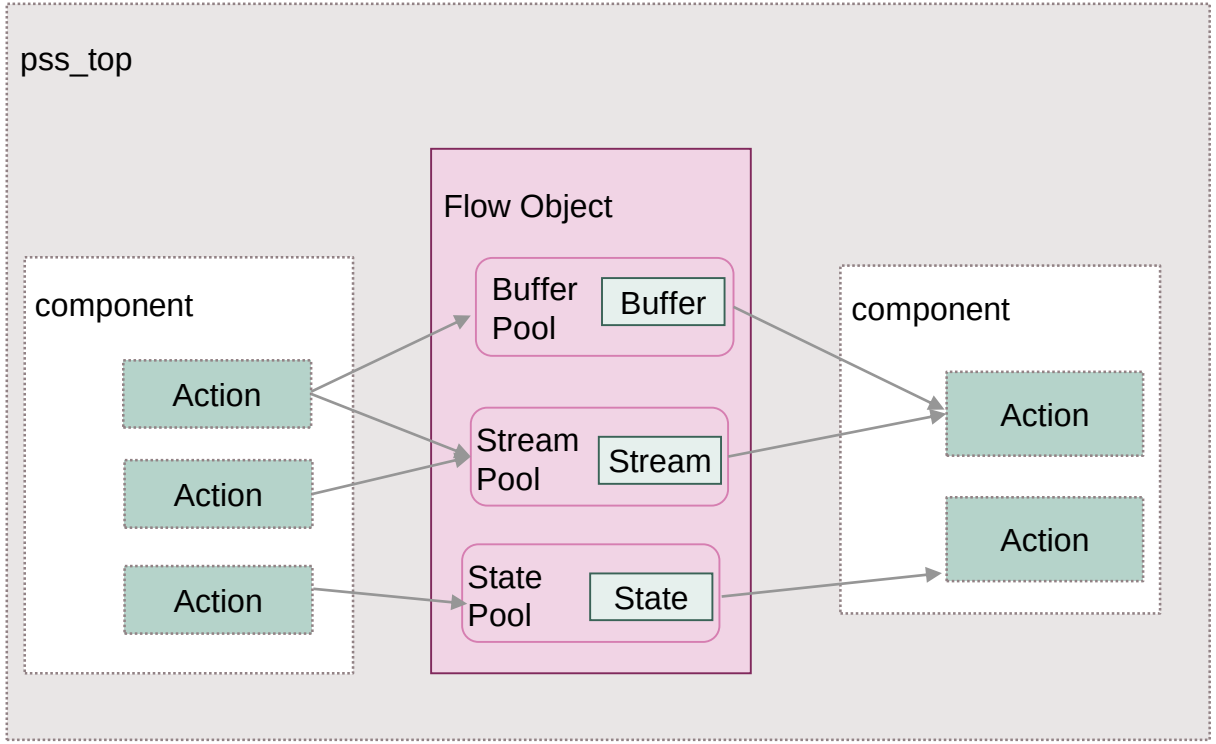
Problem statement



- Writing a PSS model manually costs in terms of human effort

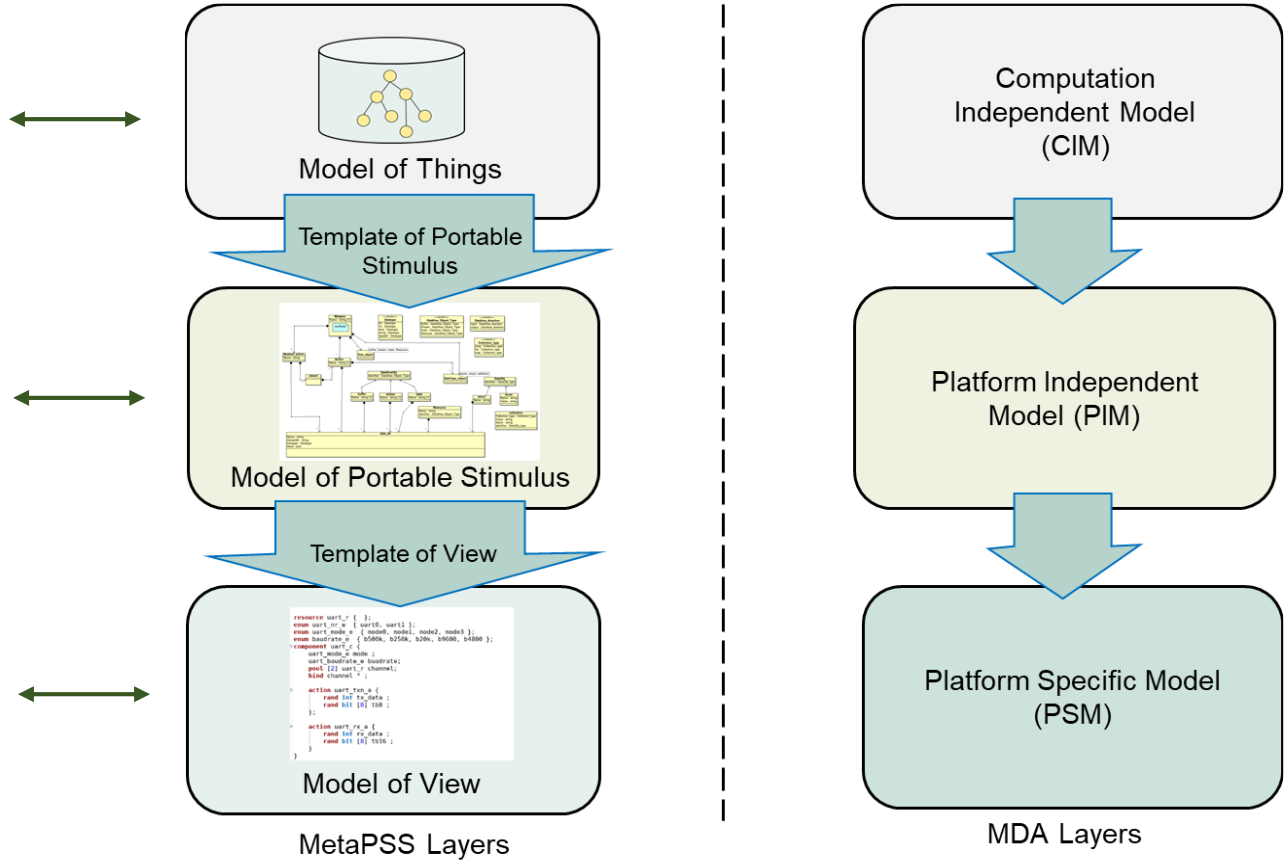
Taxonomy of PSS model

- Component - encapsulating reusable model units
- Action - unit of behavior
- Flow objects - transmit data



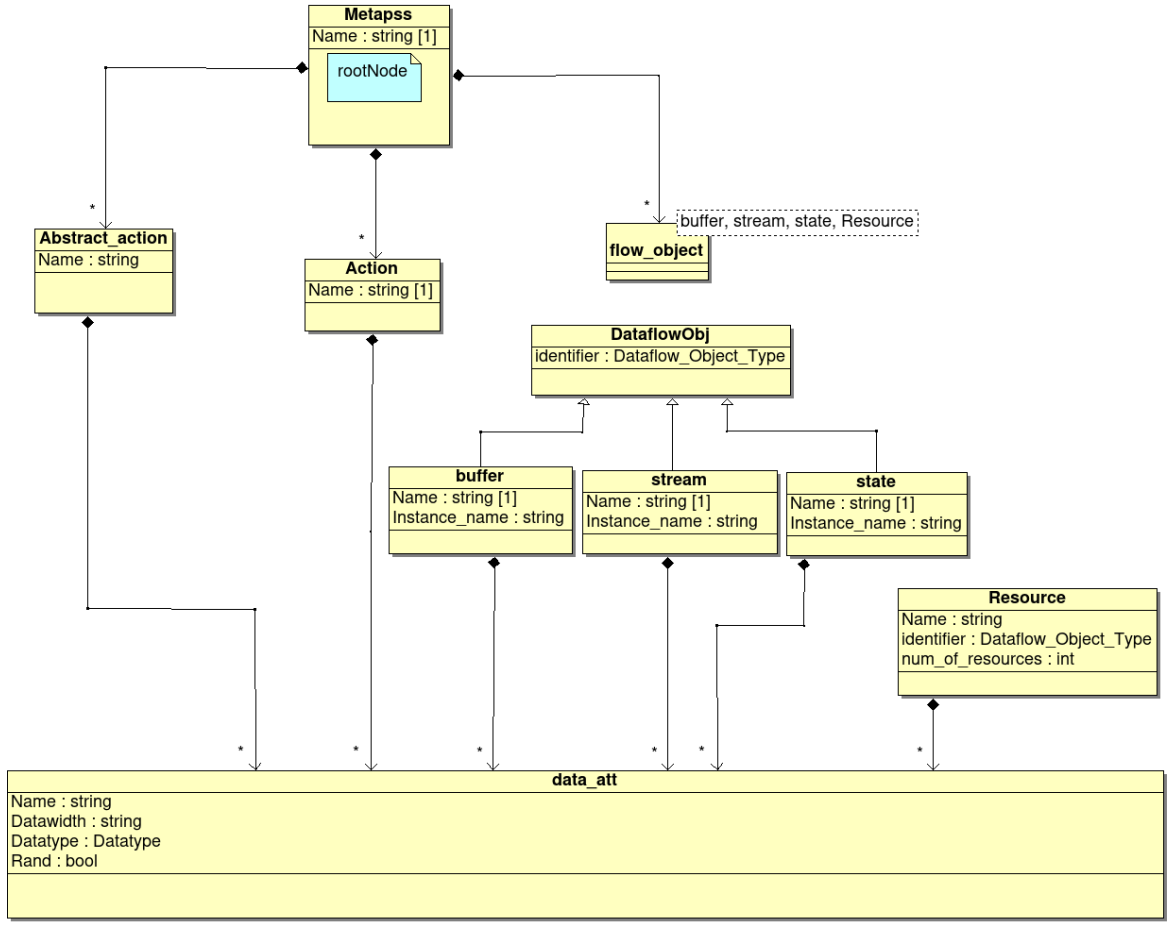
Model-driven PSS generation flow (1)

- Capture high-level attributes
- Platform independent way of describing PSS model
- Enables the developer to consider the view that must be generated



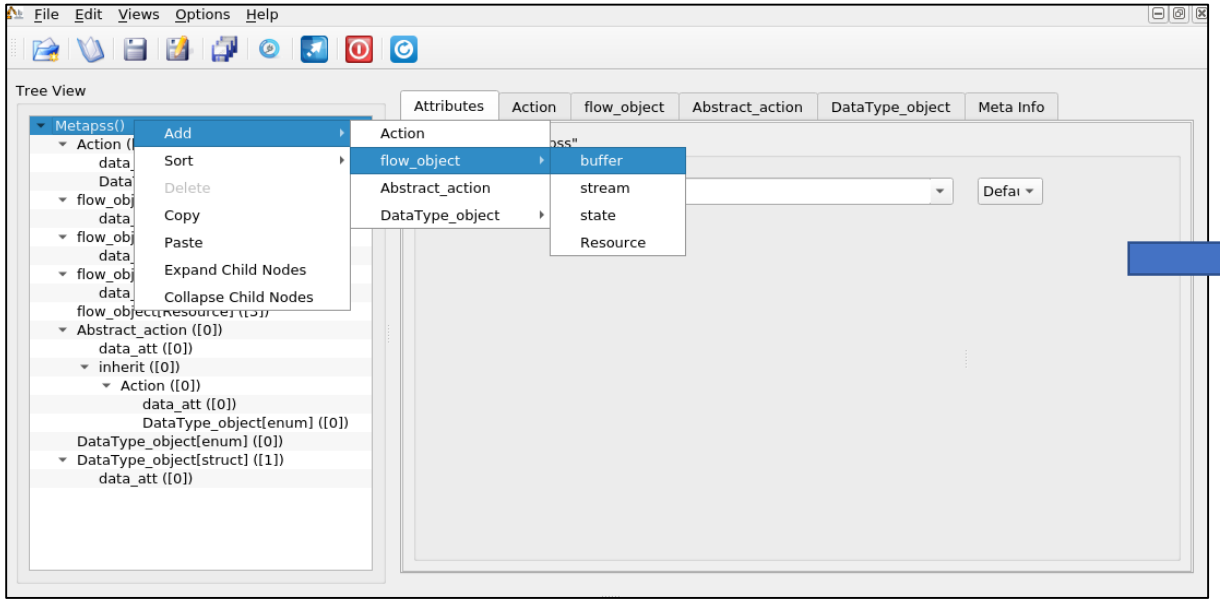
Model-driven PSS generation flow (2)

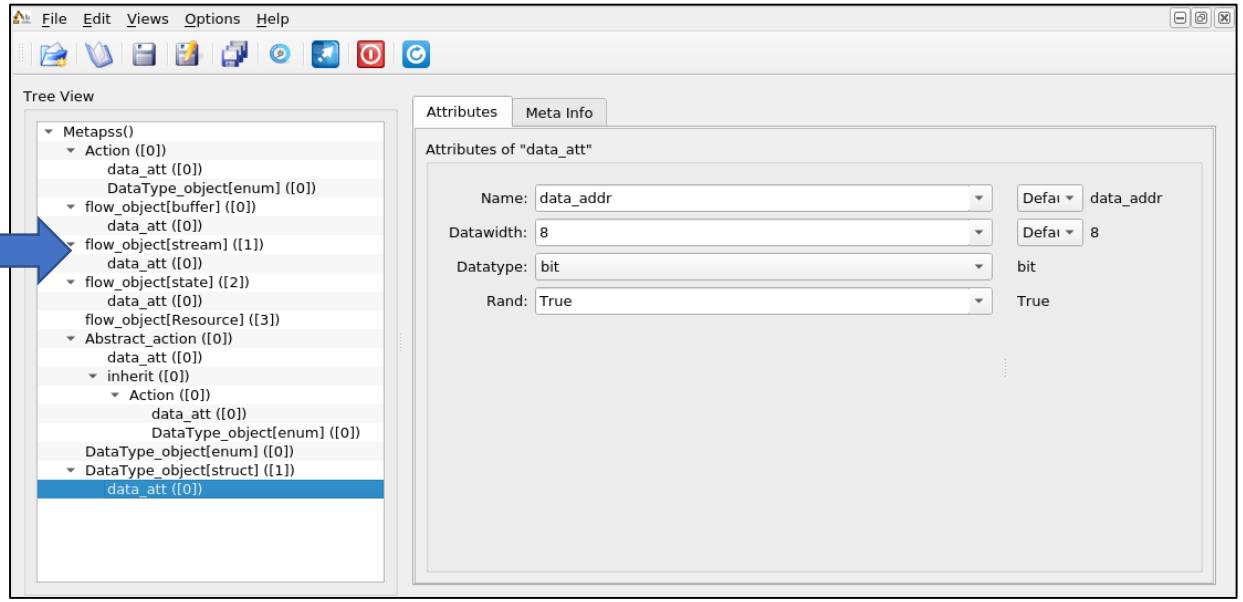
- MetaPSS: A meta-model to signify PSS
- Backbone of the automation framework
- One-time effort
- Define the structure and elements of PSS



Code Generation (1)

- Run <make gui>





- Graphical User Interface to fill the XML Data Structure

Code Generation (2)

- Steps for each PSS model generation
  1. Review the design specification
  2. Identify key elements of PSS
  3. Fill the required data in GUI
  4. Save as **.xml*
  5. Run < make pss >

- Generate Portable Stimulus model as **.pss*

- Runtime for the generation of code ≈ 1 sec

```
resource uart_r {  }

enum uart_mode_e  {mode0, mode1, mode2, mode3};
enum baud_rate_e{b2m, b500k, b250k, b115k, b20k, b19k, b9600};
enum uart_nr_e  {uart0, uart1};

component uart_c {

    pool [2] uart_r uart_p ;
    bind uart_p * ;

    //import package here //

    action uart_txn {
        rand int tx_data ;
        rand bit [8] tb ;
            // start of user code here for action uart_txn //


            // end of user code here for action uart_txn //
     };
}
```

Advantages

- Re-usable multiple time
  - An example of re-usability

- Give a quick start for working on the Portable Stimulus methodology

- Defined space to add dynamic and design specific user code

```
resource i2c_resource_r {  }
enum i2c_mode_e  {host, device};
enum baudrate_e  {k100,k400,M1};

component i2c_c {

    pool [2] i2c_resource_r i2c_resource_p ;
    bind i2c_resource_p * ;
    //import package here //

    abstract action data_xfer {
        rand bit start ;
        rand bit stop ;
        rand bit [10] addr;
        rand bit [8] data_q;
        rand int trans_id ;
        rand bit addr_ack ;
        rand bit [8] wdata;
        rand bit [8] rdata;

    // start of user code here for action data_xfer //

    // end of user code here for action data_xfer //
    };

    action host_to_target : data_xfer {
              int num_of_word ;
 // start of user code here for action host_to_target //

 // end of user code here for action host_to_target //
    };

    action target_to_host : data_xfer {
              bit [32] host_timeout_ctrl ;
 // start of user code here for action target_to_host //

 // end of user code here for action target_to_host //
     };
}
```

Conclusion

- Reduce effort to utilize Portable Stimulus methodology reinforced verification
- An automation framework contains major key constructs of PSS
- Generated PSS representation is an abstract model and platform independent
- Not included executable that defines the targeted verification platform

Acknowledgement

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Questions