Slicing Through the UVM's Red Tape

A Frustrated User's Survival Guide

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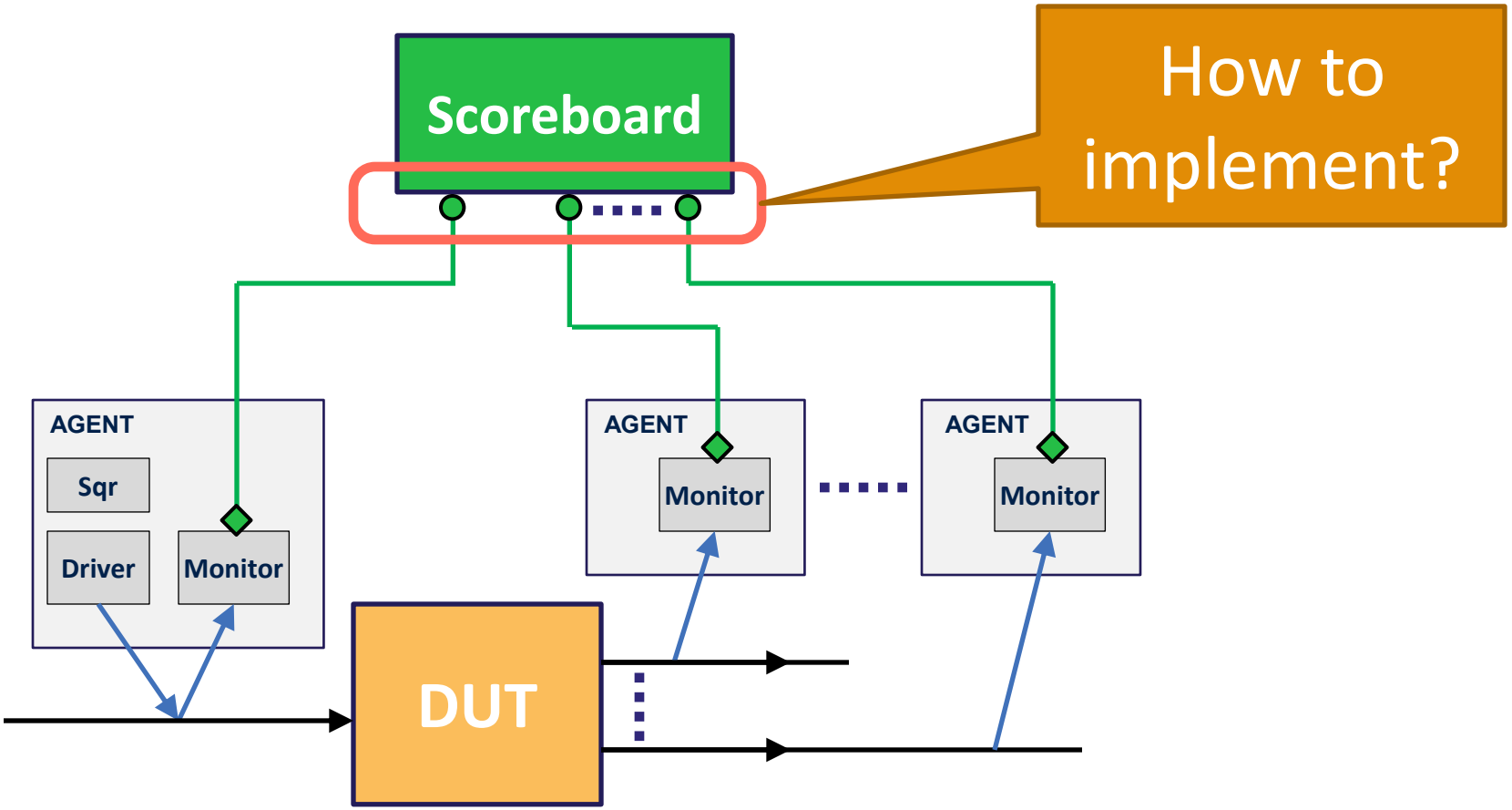
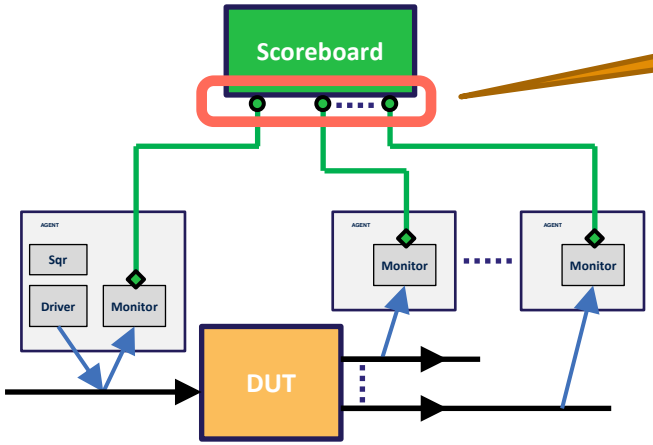
UVM != Straitjacket

- Doesn't cover everything
- Some key common requirements unsatisfied
- User must make intelligent choices
- Basic standard approaches not always optimal

Example 1: Multi-Subscriber



Multi-Subscriber: BAD IDEAS

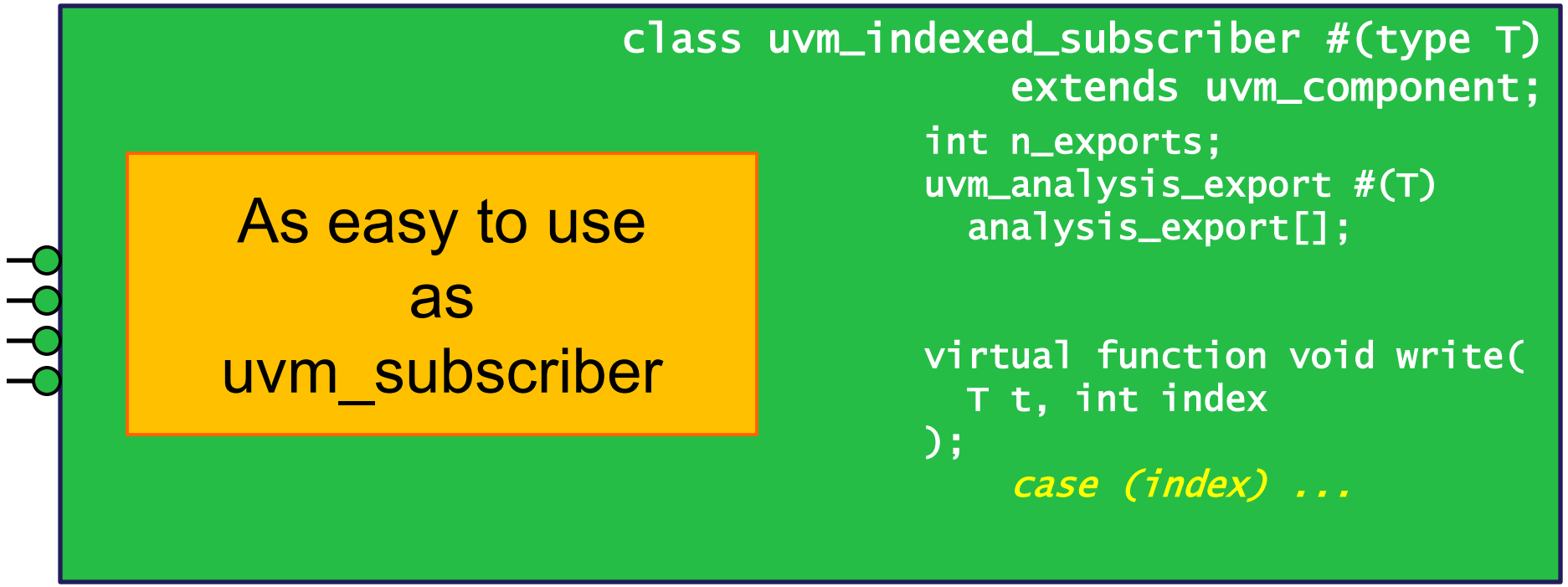


How to implement?

- uvm_analysis_fifo
  - poor fit with typical problems
  - "collector" process is hard to design well
- uvm_analysis_imp_decl
  - doesn't scale to N similar sources
  - unbelievably nasty
- subscriber instances
  - too much customization work

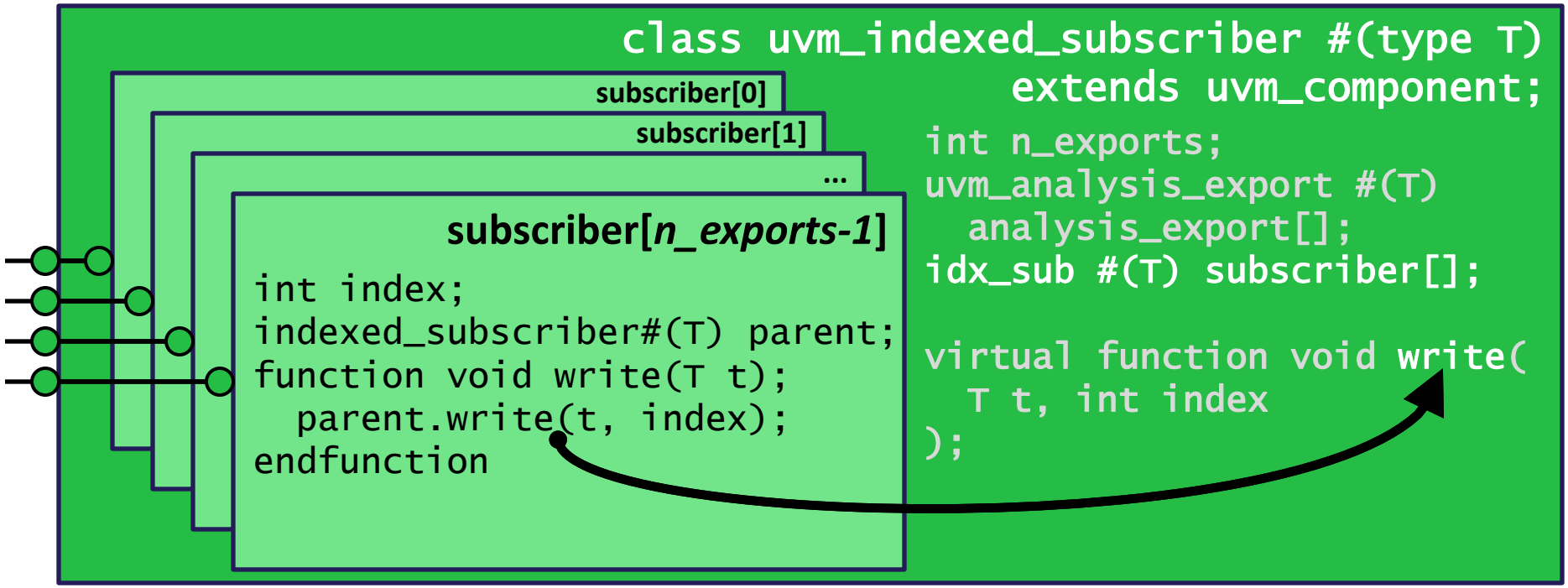
Consider the Essentials

- Configurable (dynamic) array of analysis_export
- `write(txn,index)` for custom functionality

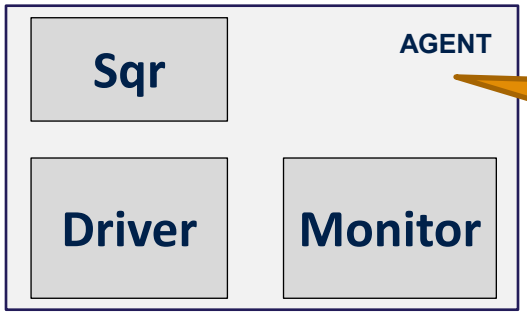


Implement!

- Base class contains embedded subscriber class
- Base class constructs arrays



2: Deploying Config Objects



No uncertainty about this structure

- Config DB? *not the only way* to get information into components
- Not even optimal, within a well-defined structure
- Use config DB to get stuff into the agent…

Agent then uses simple copy to distribute it to child components

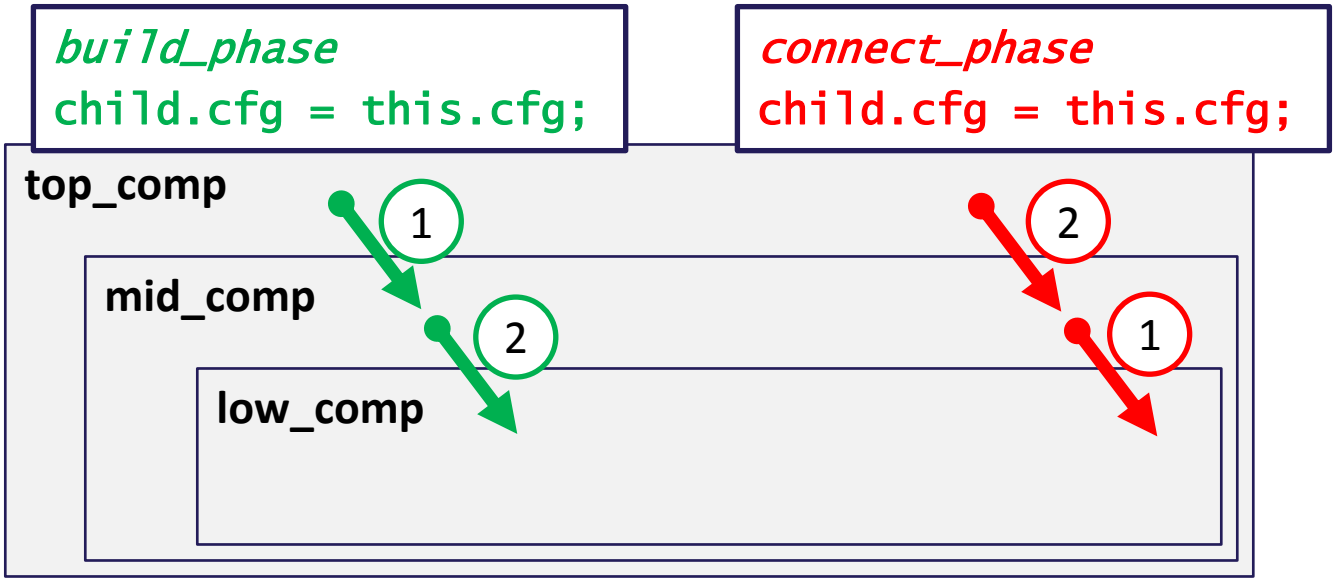
Config Deployment: BAD IDEAS (1)

- insist on an entry in config_db
  - maybe it was provided by copy!

```
function void build_phase(…);
  super.build_phase(phase);
  if (!uvm_config_db#(my_cfg_class)::get(…)) begin
    `uvm_error("NO_CFG", …);
  end
```

Config Deployment: BAD IDEAS (2)

- push a value downwards in connect_phase
  - it's bottom-up!



Config Deployment: BAD IDEAS (3)

- Excessively lax wildcard matching
  - jeopardizes reusability

```
uvm_config_db#(my_cfg_class)::set(
  this,
  "*",
  "cfg",
  cfg );
```

Targets ***any*** descendant component!

Consider the Essentials

- Within a well-known structure, use methods or copy
- Allow for off-standard customization (use configDB)

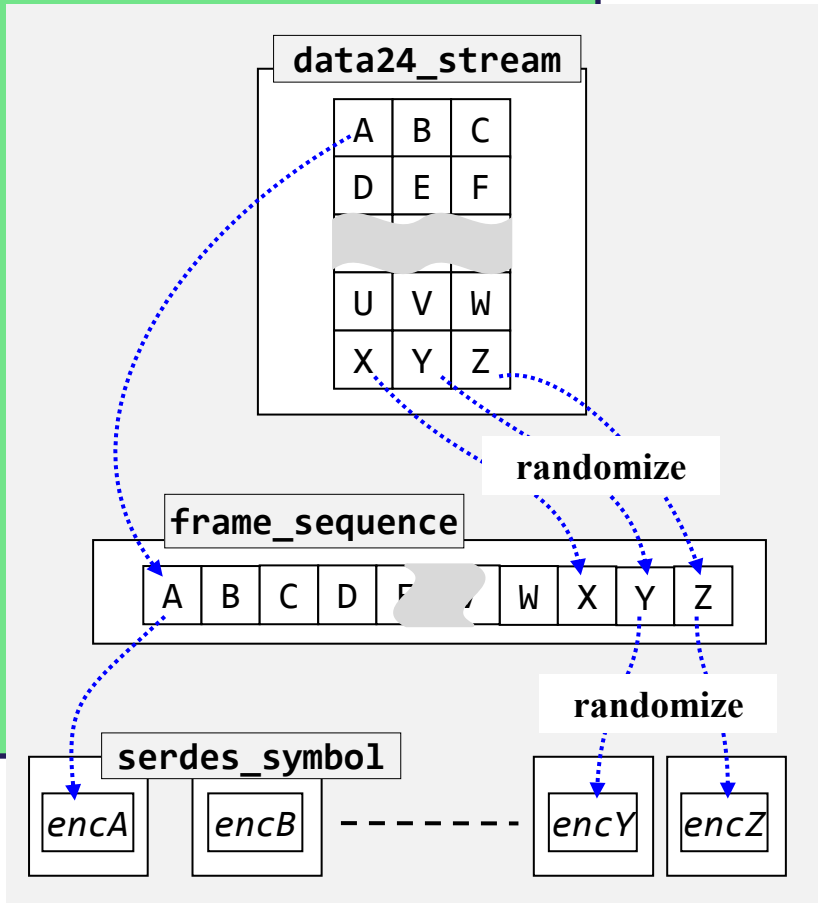
```
function void build_phase(…);
  super.build_phase(phase);
  if (uvm_config_db#(my_cfg_class)::get(…, cfg)) begin
    `uvm_info("CFG_FROM_DB", …)
  end
  if (cfg == null) begin
    `uvm_error("NO_CFG“, …)
  end
```

Config-DB can override copy

Flexible for any component

3: Layered Data-intensive Sequences

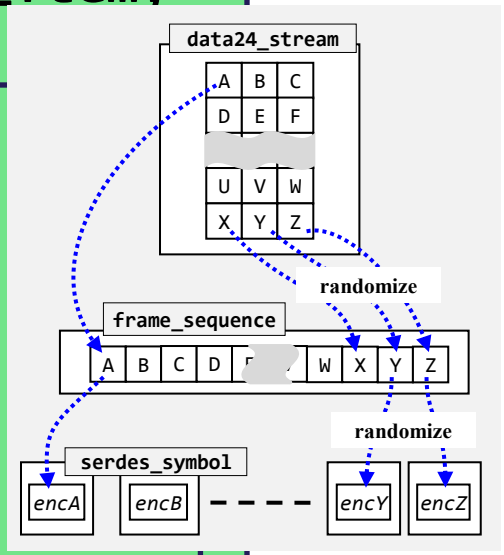
```
class serdes_symbol extends uvm_sequence_item;
  rand bit [9:0] symbol_bits;
  rand int n_bits;
  rand bit timing_error;
  constraint symbol_10_bits {
    soft !timing_error;
    if (timing_error) {
      n_bits inside {[1:10]};
    } else {
      n_bits == 10;
    }
  }
```



3: Layered Data-intensive Sequences

```
class serdes_symbol extends uvm_sequence_item;
  rand bit [9:0] symbol_bits;
```

```
class frame_sequence extends uvm_sequence;
  rand bit [7:0] fr_data[];
  task body();
    serdes_symbol sym;
    foreach (fr_data[i]) begin
      bit [9:0] val = encode(fr_data[i]);
      `uvm_do_with( sym,
          {symbol_bits == local::val;} )
    end
  endtask
  …
endclass
```

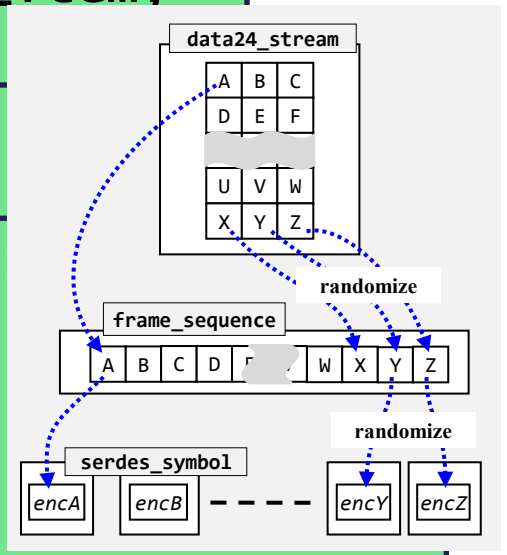


3: Layered Data-intensive Sequences

```
class serdes_symbol extends uvm_sequence_item;
  rand bit [9:0] symbol_bits;
```

```
class frame_sequence extends uvm_sequence;
  rand bit [7:0] fr_data[];
```

```
class data24_sequence extends uvm_sequence;
 rand bit [23:0] stream_data[];
  task body();
    frame_sequence fr_seq;
    `uvm_do_with( fr_seq, {
       frame_data.size() == 3*stream_data.size();
       foreach (stream_data[i]) {
         frame_data[3*i]   == stream_data[i][23:16];
         frame_data[3*i+1] == stream_data[i][15:8];
         frame_data[3*i+2] == stream_data[i][7:0];
       ...
```



Data Sequences: BAD IDEAS

- randomize everything
  - inefficient, clumsy
- strictly deterministic code
  - limits flexibility

Consider the Essentials

- Allow for error injection
- Plan for flexibility
- Consider efficiency
  - especially for small low-level sequences

```
rand bit [7:0] fr_data[];
task body();
  serdes_symbol sym;
  foreach (fr_data[i]) begin
    `uvm_create( sym )
    sym.symbol_bits = encode(fr_data[i]);
    `uvm_send( sym )
  end
endtask
```

No flexibility lost

Takeaway

- UVM is a great kick-start
  - **not** the end of the journey
- It's only code! Be prepared to try out new ideas
  - but have a fallback; ideas sometimes don't work out
- Don't trust “UVM has done all the work for you”
- Share good ideas to limit wheel reinvention
  - forum sites
  - constructive review
  - in-house toolkits / patterns

Thank You!

Any Questions?