In Search of the Perfect Mega-widget

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What is a Mega-widget

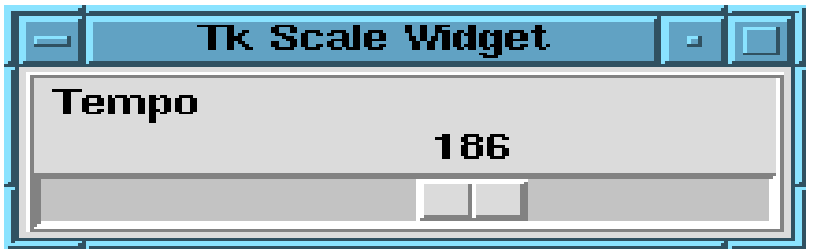
- Tk widget written in Tcl
  - Can be entirely in Tcl or a combination of Tcl and C
- Behaves ***exactly*** like a built-in widget
  - Script writer doesn't need to know whether a widget is ***mega*** or ***built-in widget***

Sample Uses for Mega-widgets

- Combinations of existing widgets
  - Combo-boxes
- Changing the “look” of existing widgets
  - Example: new ***scale*** widget
- Adding behaviors to an existing widget
  - **text** ⟹ HTML message widget
- Removing functionality from a widget
  - Enforce a standard look & feel

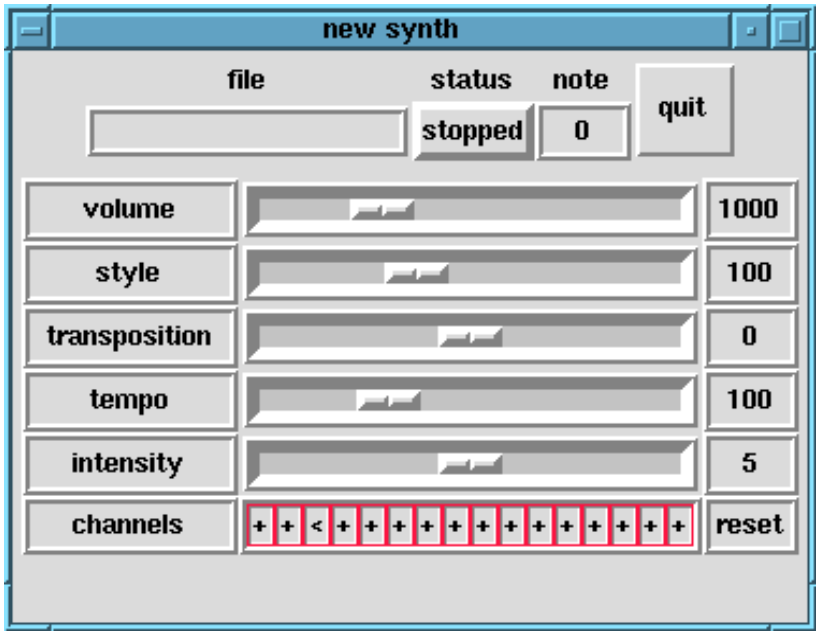
Space-saving Scale Widget

- Stock scale widget



- *Space-Saving* `scale` widget

- Sample *Space-saving* interface



A Mega-widget Solution

- What it is:
  - A small change to the “core” of Tk to provide the mechanism for a complete mega-widget capability in Tcl
- What it isn’t:
  - A namespace facility
  - A framework for constructing mega-widgets
  - A set of mega-widgets

Properties of Built-in Widgets

- Command interface
- Behavior
- Bindings

Properties: Command Interface

- widget `.foo ?-option -value…?` ⟹ `.foo`
- `.foo configure ?-option -value…?`
- `.foo cget -option`
- `.foo sub-command ?args?`

Properties: Behavior

- `winfo` *command* `.foo`
  - exists, class, width, height …
- Option database control of widget parameters
  - `option add` ...
- focus
  - `focus` ⟹ .foo

Properties: Bindings

- **`bind`** .foo <*Event*> *action*
  - %*X* substitutions in *action*
  - %W ⟹ .foo ...
- bindtags .foo {`.foo Foo . all`}

Summary of Changes

- Frame -*command* option
- Bind event propagation and translation
- Focus management
- Miscellaneous
  - winfo container
  - C API's to access mega-widgets

Frame -command

- Turns a frame into a container.
- Provides a hook for Tcl code to process the widget command.
- Allows access to actual frame

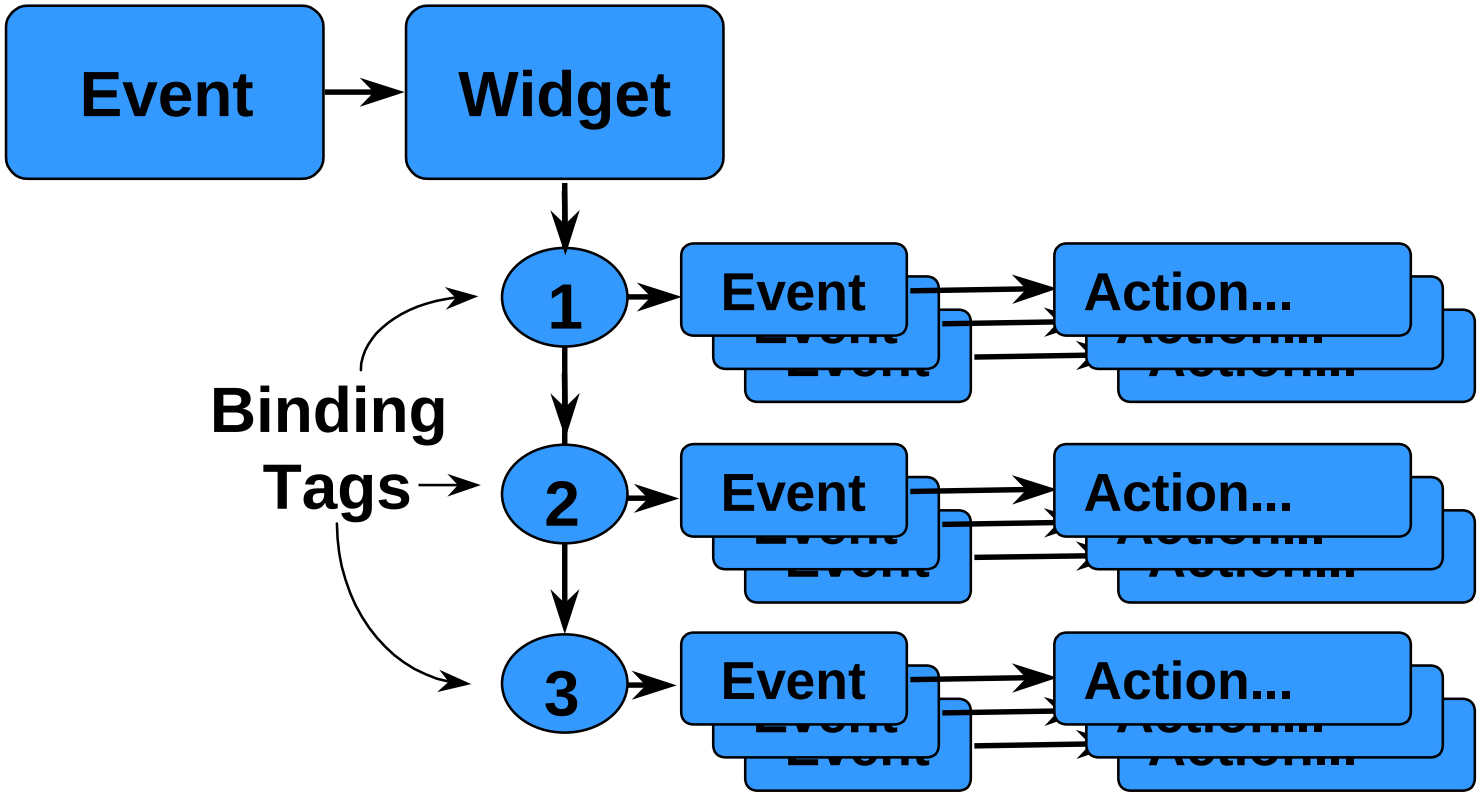
```
frame .mega -class Mega \
      -command {doMega .mega}

proc doMega {name args} {…}
```

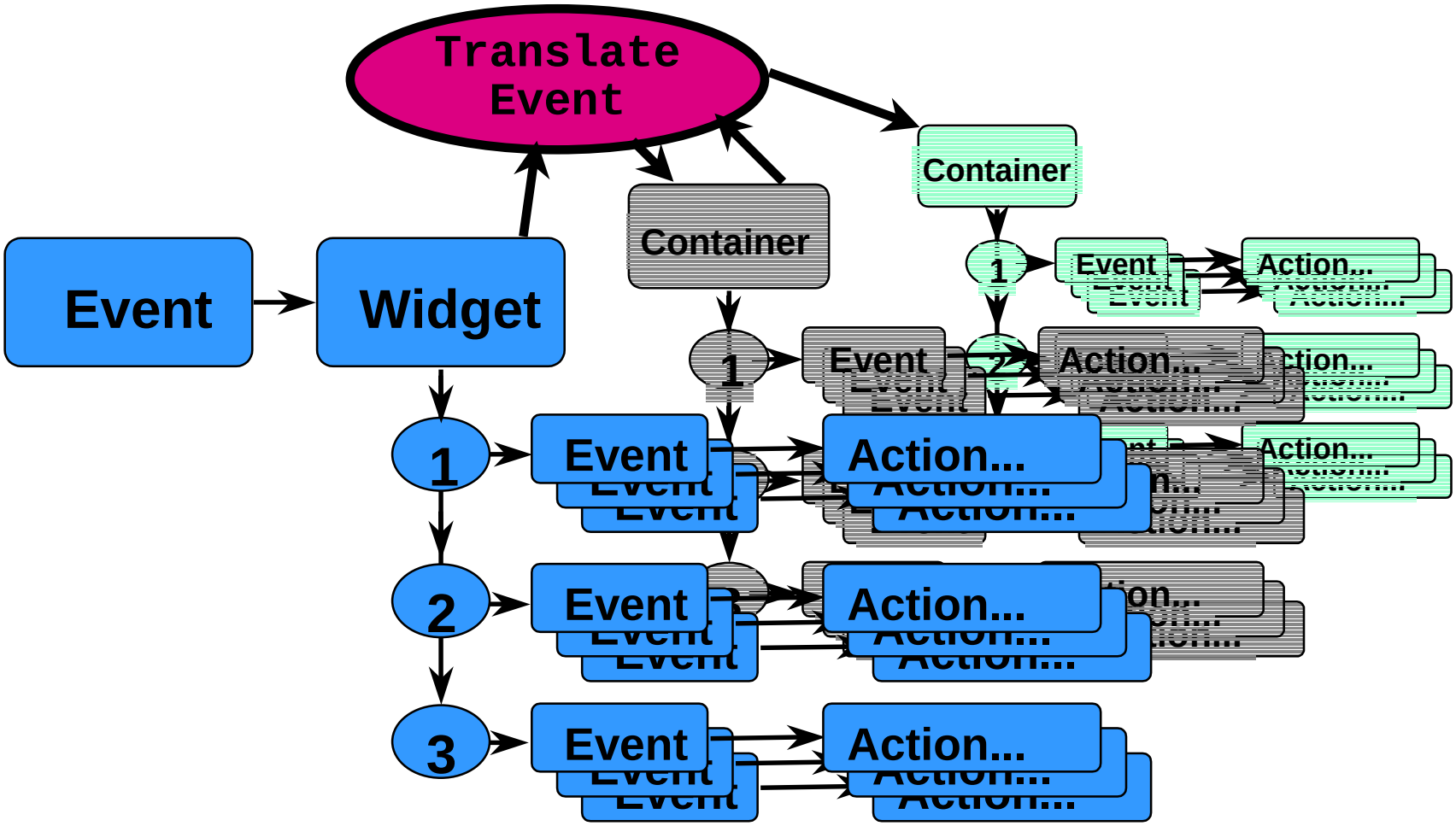
Event Propagation and Translation

- Some events are propagated to the enclosing container.
  - A new event is synthesized
  - %X substitutions are translated as required
  - The event is re-issued to the container
- Propagation and translation is repeated for each enclosing container

Tk Event/Bind Model

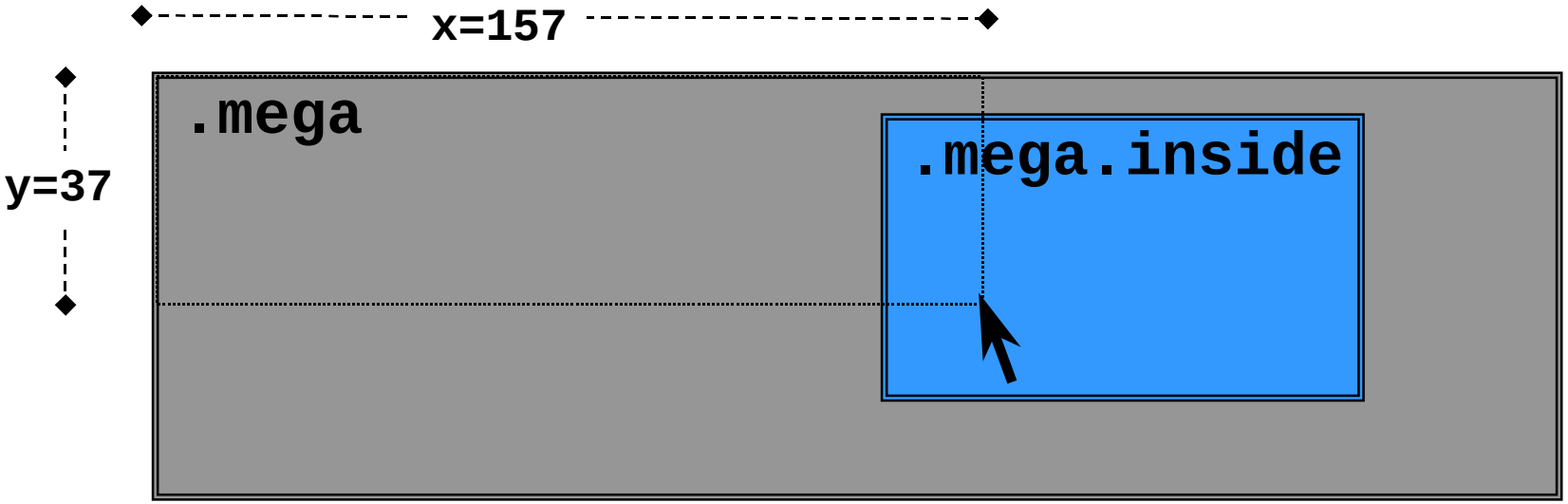


Mega-widget Event/Bind Model



Widget Binding Example

- bind .mega <1> {`puts "got: %W %x %y"`}
  - **Real** widget: got: .mega 157 37
  - "**Fake**" mega-widget got: .mega.inside 15 31

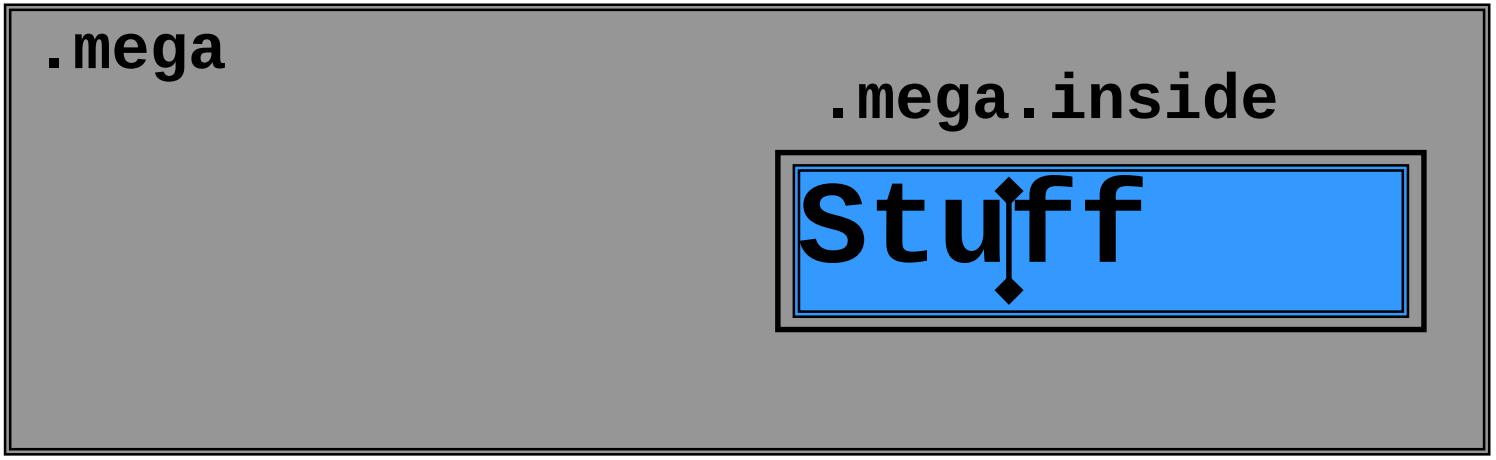


Focus Changes

- `Focus`
  - returns outermost container that has the focus
- `Focus -container` *`container_name`*
  - Returns actual focus widget (or container)

Widget Focus Example

- focus
  - **Real** widget: `.mega`
  - "**Fake**" mega-widget `.mega.inside`



Implementation

- New flags added to Tk window structure
  - IS_CONTAINER, IS_CONTAINED_IN
- Recursive event dispatch
- Event substitution rewriting
- New options/changes added
  - winfo, focus
- C API's to set/get IS_CONTAINER flag

Conclusions

- Most Mega-widget capabilities are already in Tk
- Only small changes to event and focus handling are needed
- Additional features added for convenience
  - Easy access to Tcl code
  - Mega-widget introspection