personal universal controller & consistent interface generation

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structure

- objective
- references
- personal universal controller
- consistent interface generation
- model-based interfaces generation

objective

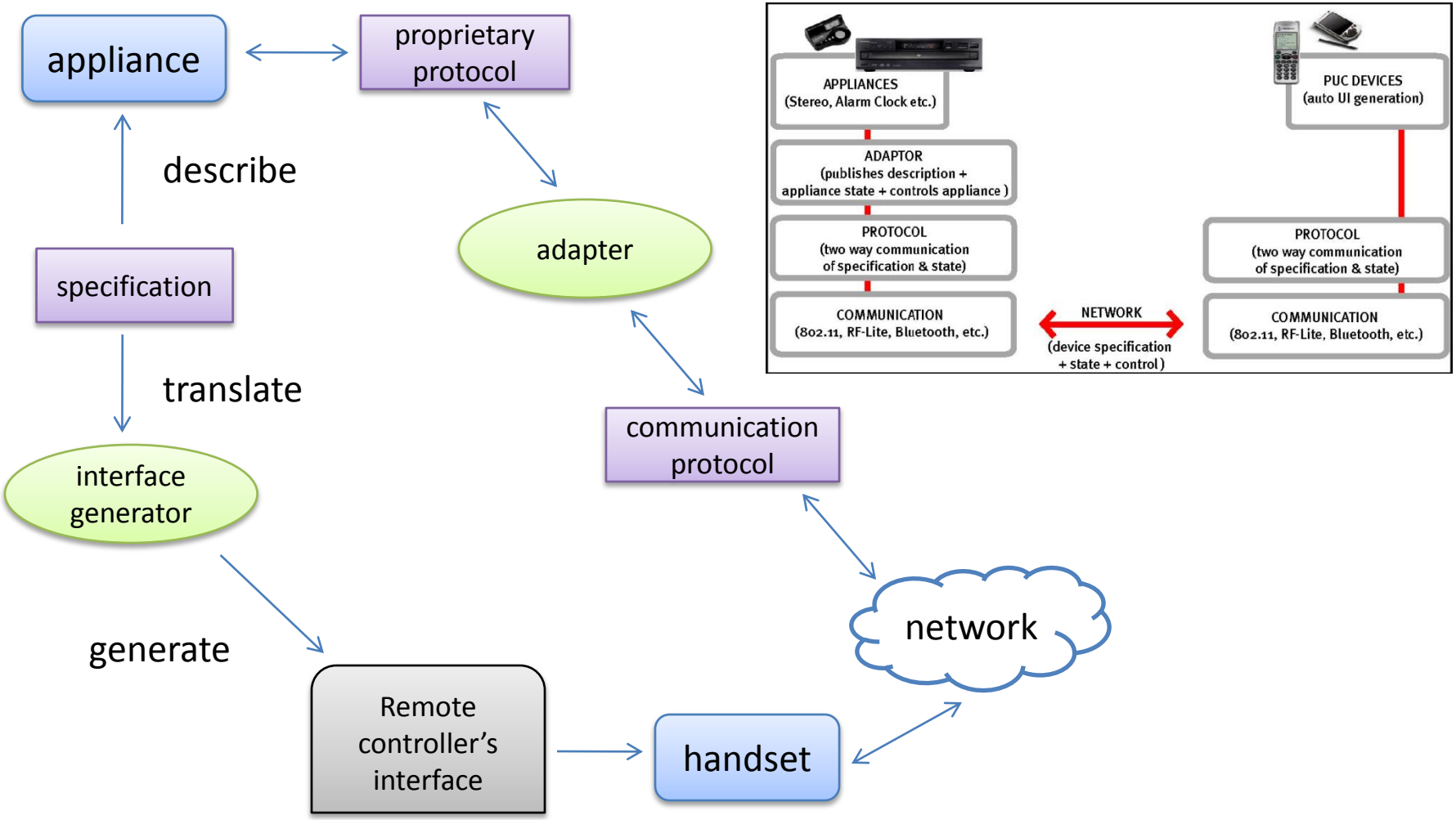
- use modeling tools to design a remote control interface of arbitrary devices on android.

References

- [1] Generating Remote Control Interfaces for Complex Appliances, Nichols et al., UIST ‘02
- [2] UNIFORM: Automatically Generating Consistent Remote Control User Interfaces, Nichols et al., CHI 2006

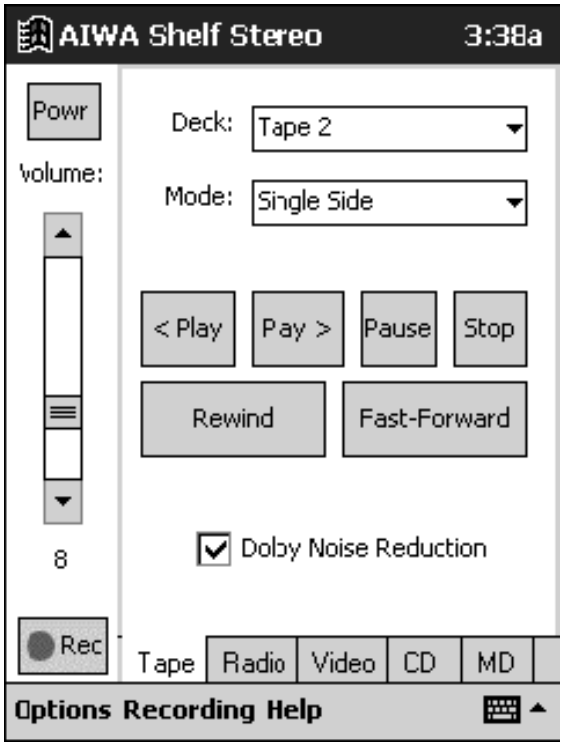
personal universal controller

how do they do?



anatomy of puc

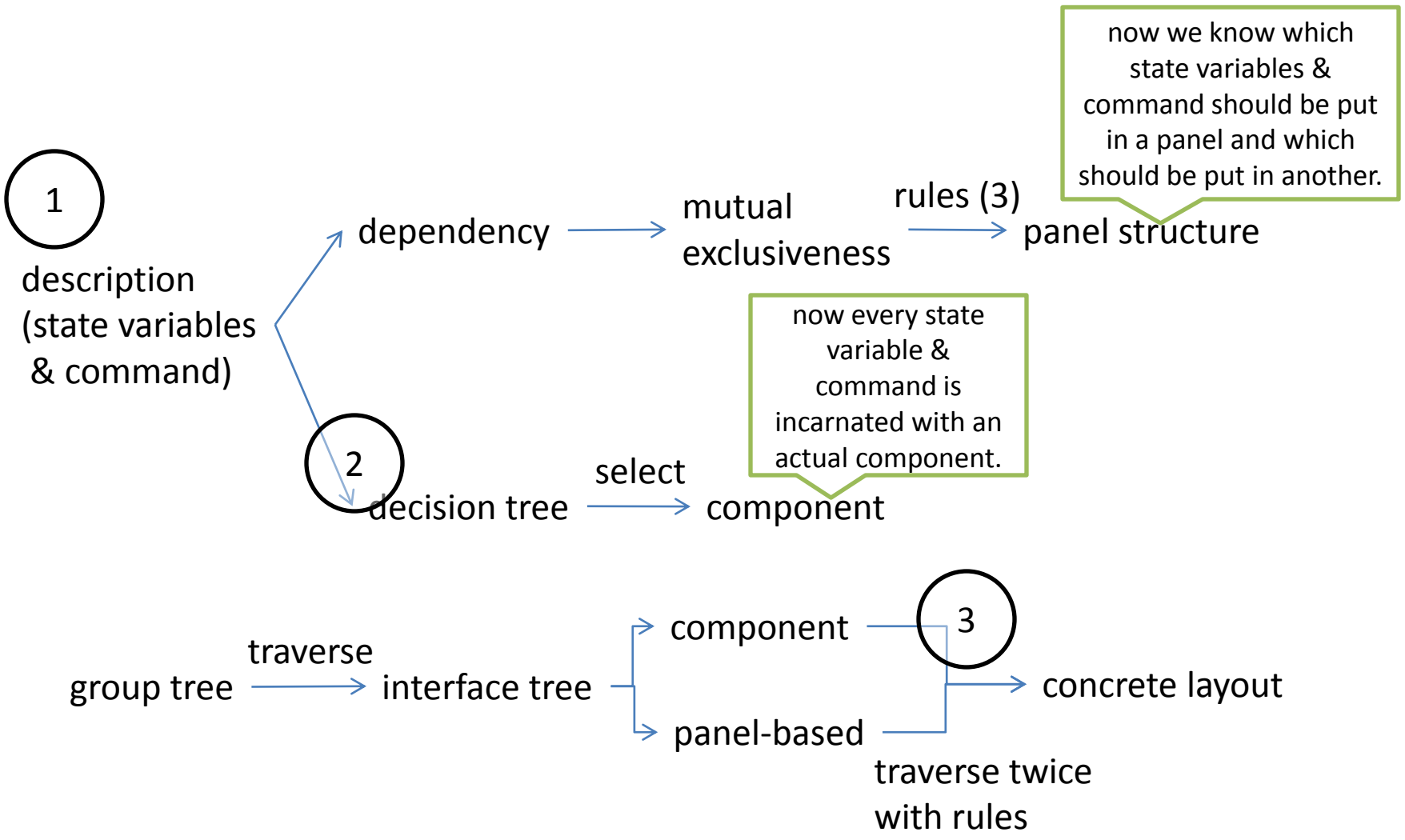
- proprietary protocol
- communication protocol
- adapter
- Specification
  - state variables and command
  - dependency
  - group tree
  - label information
  - type
- interface generator



interface generation

- from specification to abstract user interface
- from abstract user interface to concrete layout

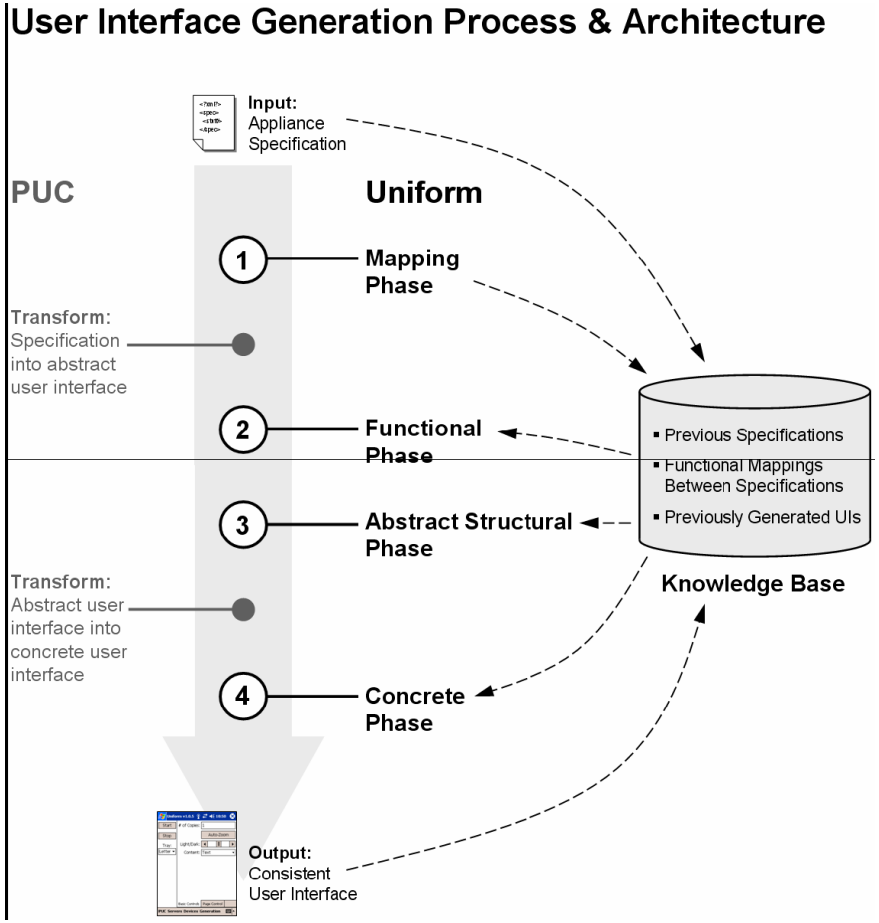
generate the interface



consistent interface generation

- background
- purpose
- consistency
- example

how do they do?

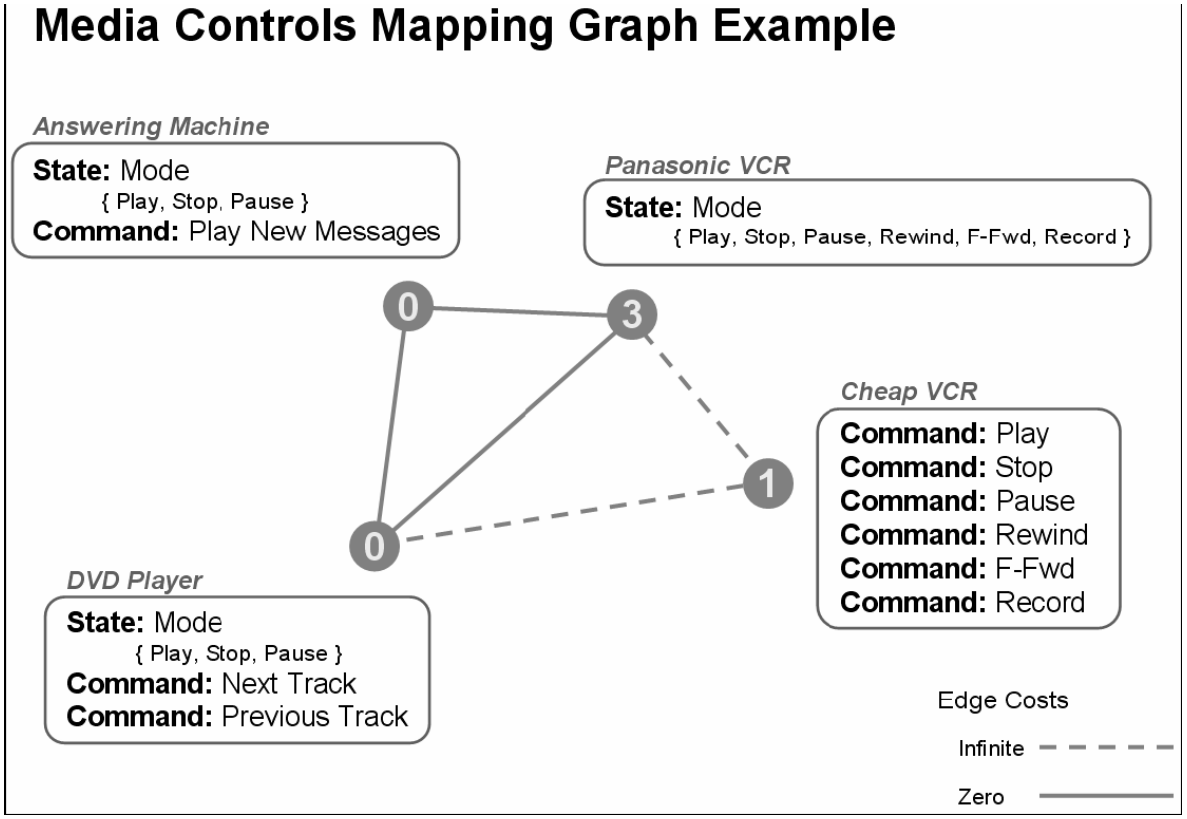


mapping

- compare specifications
- get mappings
- 6 mapping types
- group mappings with similar functions in a mapping graph
- store mappings in knowledge base

name	description
general	allows a series of operations on one appliance to be matched with series of operations on another appliance, with support for repetition. The possible operations are invoking a command or changing the value of a state variable.
state	maps two state variables. Particular values of the state may be mapped together, and a shortcut is available to define that the two states have entirely equivalent values.
node	specifies that a node in the group tree from one specification is similar to a node in another specification. A node could represent a group, command, or state variable.
list	specifies that two lists contain the same data.
group	groups multiple mappings together. Groups cannot be nested.
template	maps two Smart Templates, a special feature of the PUC specification language. Smart Templates allow the PUC to render domain-specific design conventions, such as the standard number pad layout on a telephone or the media control icons on a VCR.

mapping graph



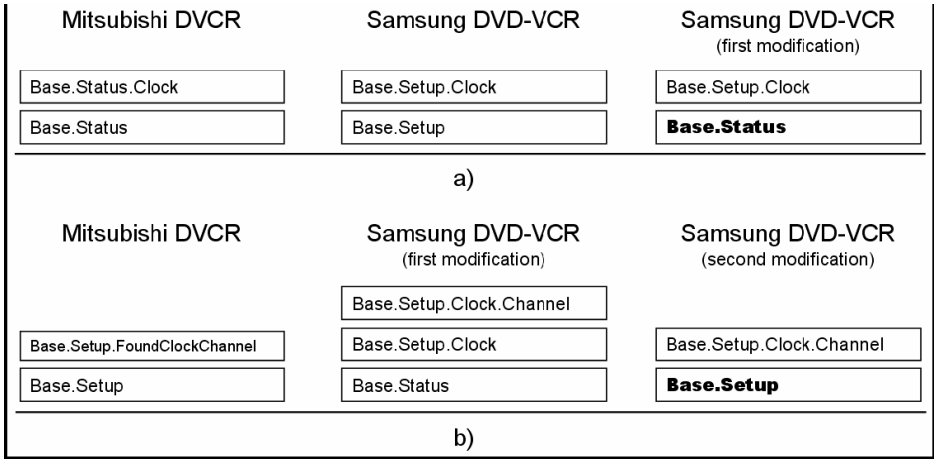
functional phase

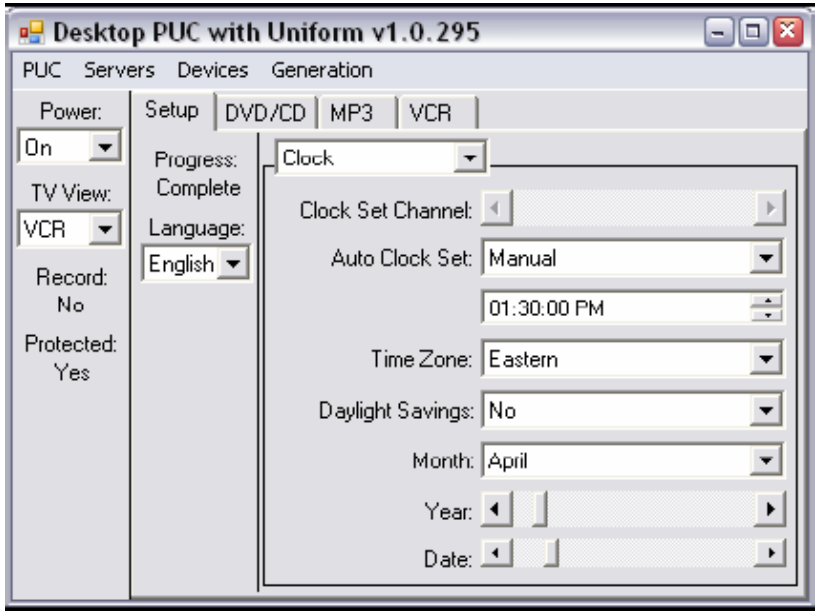
- inspecting each function
- traverse mapping graph
- transform the new specification based on consistency rules
- select the first rule that matches the mapping

name	description
state	ensures that similar variables use the same label and, if possible, the same control
invoke-to-invoke	ensures that similar commands use the same label
change-to-repeated-invoke	converts between the situation where changing a variable on appliance is the same as repeatedly invoking a command on another
change-invoke-change	converts between the situation where one appliance has a state variable and the other has a state variable with a command that must be invoked before a variable change will take affect
time-end-to-duration	converts between the situations where one appliance uses a start time and an end time and another appliance uses a start time and a duration
template	ensures that smart templates use the same label and control style
node	ensures that nodes mapped with a node mapping use the same label
generic-group	takes a group of mappings and processes the other mapping rules on each of them

abstract structural phase

- step 1: moving
  - search for mappings
  - keep track of mapping node's parent node
  - include mappings in the containment stack
  - compare stacks
  - transform the new specification based on rules




Desktop PUC with Uniform v1.0.295
PUC
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Devices
Generation
Power:
On
TV View:
VCR
Record:
No
Protected:
Yes
Setup
DVD/CD
MP3
VCR
Progress:
Complete
Language:
English
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Auto Clock Set:
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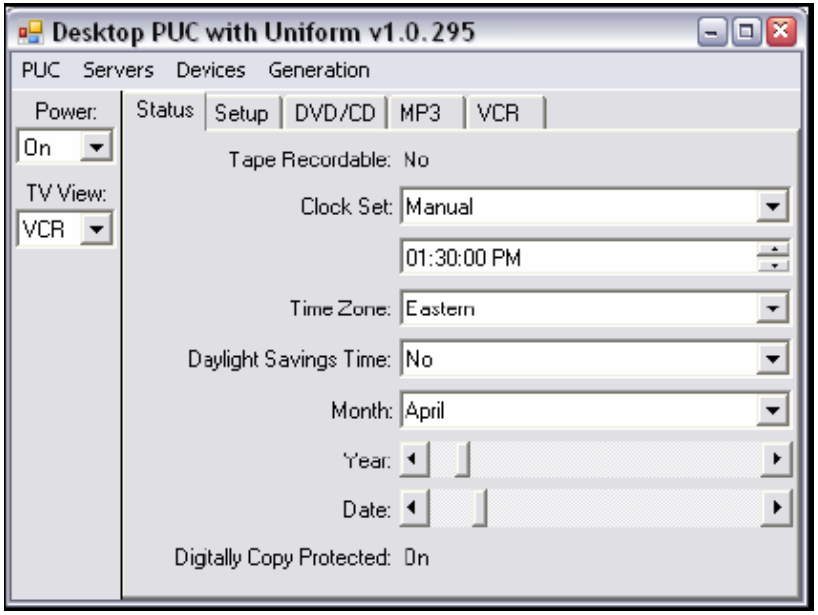
Desktop PUC with Uniform v1.0.295
PUC
Servers
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01:30:00 PM
Time Zone:
Eastern
Daylight Savings Time:
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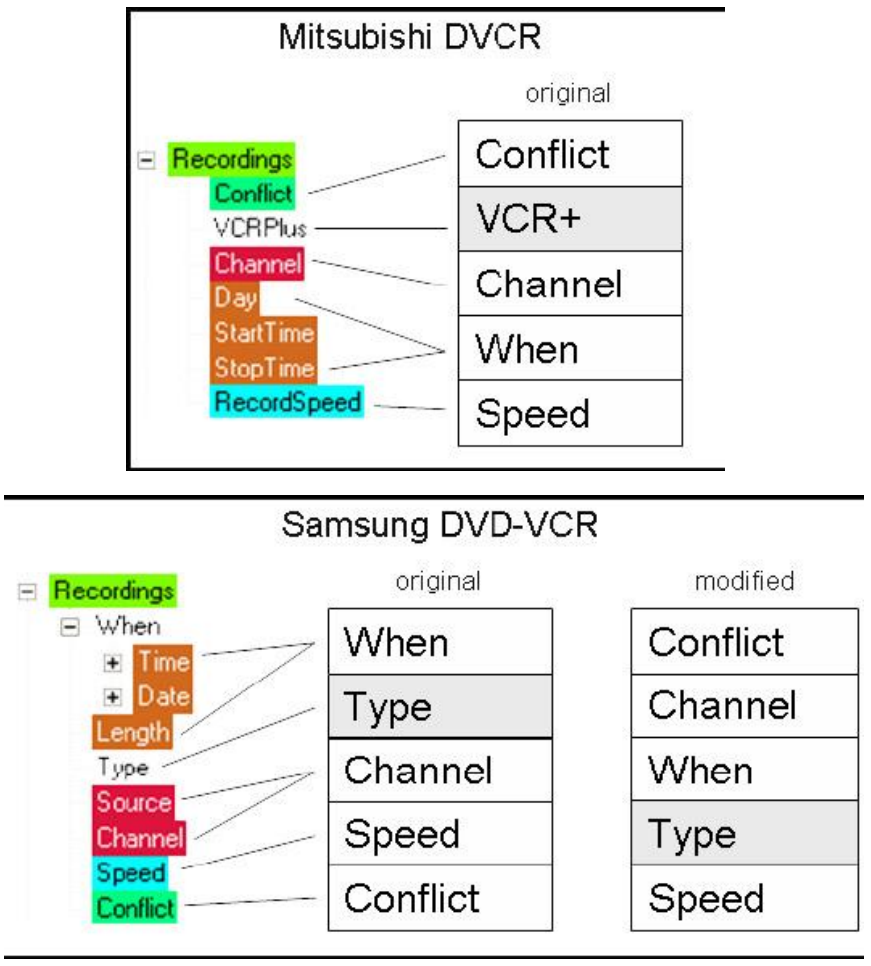
abstract structural phase

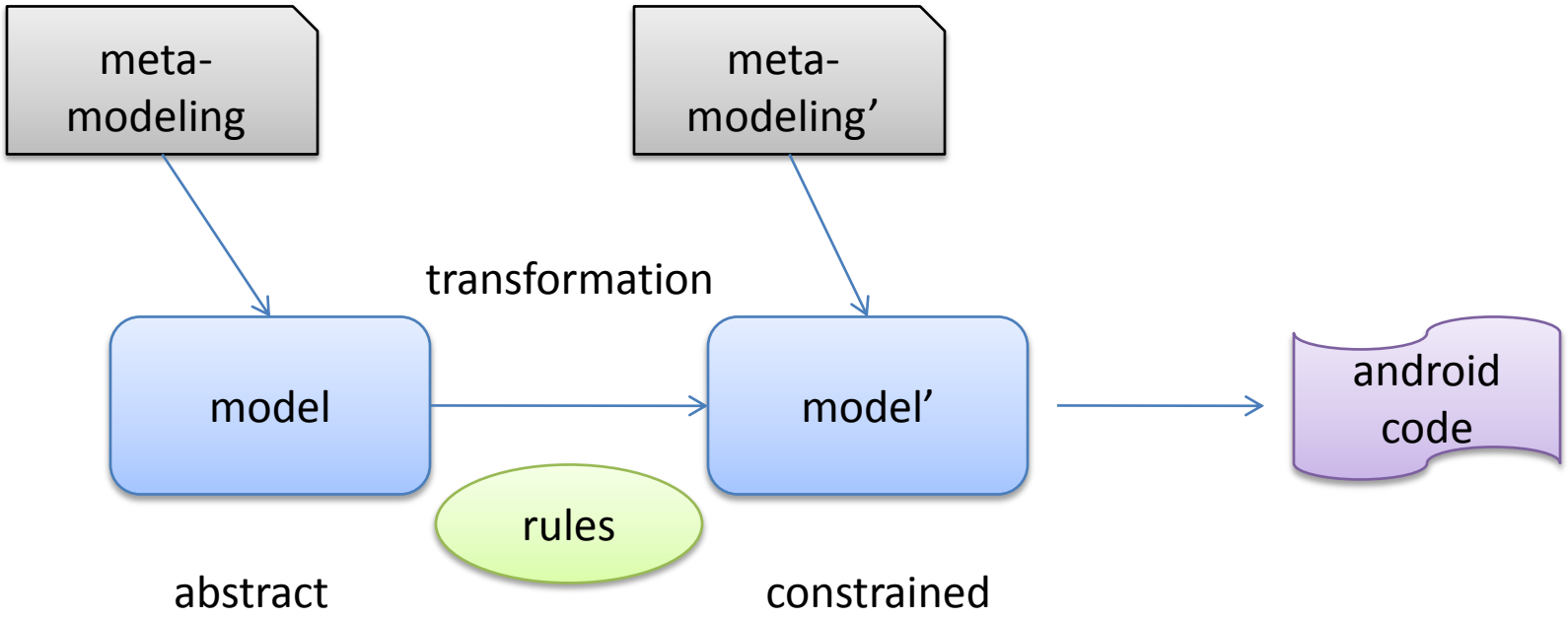
- step 2: re-ordering
  - search for mappings
  - set block list for a group
  - reorder the new specification by the reordering rules



concrete phase

- two rules to ensure a similar visual appearance.
- one is to modify the concrete user interface to add organizational elements
- another is to modify the orientation and sizing of some visual elements

model-based interfaces generation



Thank you