Advanced Expression Building
Tomas Juknevičius, Sr. Systems Analyst
Q&A: Type your questions here

[Enter a question for staff]
What - Structured Expression Dialog
Why - Model Analysis

• Modeling tools live and die by the strength of Analysis functions they provide

• A lot of “active” features in MagicDraw
  – derived properties, custom table columns, relationship criteria in matrices, relation criteria in maps, smart packages, active legends (19.0), model metrics, model validation

• Need to specify computation
Notes

• Will NOT be covering concrete applications
• See an introductory Webinar:
  – https://www.youtube.com/watch?v=AaPdonhuQM4
• Some demonstrated features are v19.0
What is Expression Tree?

• Compute $A \times \sin(x + \pi / 2)$
  – With $x=1.0472$, $A=3.6$

• Answer 1.8

• How did we compute that?
What is Expression Tree?
Expression Tree Nodes

• Constants
  – Strings, Numbers, model Elements, Collections

• Contextual Variables
  – THIS

• Operations (Functions)
  – Multiple Inputs, Single Output
  – Output of one connected to input of another
Simple(r) Expression

• Demo for Constants - simple Find
• Demo for Operation connecting
  – Metachain on Find Results
• Some pitfalls, recommendations for the dialog GUI
  – Standard/expert mode, root union, predefined nodes
  – Drag&Drop, Copy/Paste
  – Evaluation dialog
  – Naming nodes
Simple(r) Expression

- Quick run through Simple, Metachain operations
- Metachain split with interim operation insertion
Reusable Operations

• OpaqueBehavior

• Parameters, Types
  – java.lang.Object type
  – Type coercion

• Demo – making Set Intersection, calling
Using Scripts

• Define reusable operations
• Inline in another expression
• Available languages, JSR-223
• Available APIs
  – MagicDraw OpenAPI, including non-model objects (useful classes: ModelHelper, StereotypesHelper, ExpressionHelper)
  – Java API
Using Scripts, Cont

• Demo example – Count/isEmpty
• Demo – diagram contents calculation
Higher Order Operations, Filter

• Filter operation
• Second parameter is special
  – Define operation, do not evaluate it, but pass it as an argument
• Demo – Filter with property test
HO Operations in General
Higher Order Operations, Map

- Steal it from Cameo Collaborator!
- Definition of Map, MapFlat
HO Operations, Roll-your-own

- Demo - ZipWith
- Demo - Reduce
Recursion

- Best done with derived properties
- Can be encoded in scripts
Putting it All Together

• Demo
Conclusion

• Hereby MagicDraw fell to Greenspun’s tenth rule 😊
  – Any sufficiently complicated C or Fortran program contains an ad-hoc, informally-specified, bug-ridden, slow implementation of half of Common Lisp.

https://en.wikipedia.org/wiki/Greenspun%27s_tenth_rule