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Systems *Engineering: Design and Development*

ENGR 387

Agenda

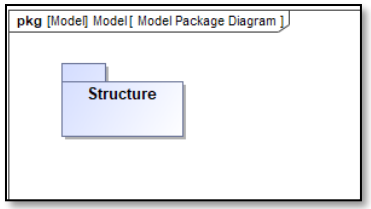
- Packages
- Package Diagram Frame
- Package Diagram Kinds
- Dependencies in Package Diagrams
- Organizing the Model with Packages
- Package Diagram – Views
- Package Diagram Containment Relationship
- Namespace
- Modelio Example of Package Digram

Packages

- Packages are used to organize the model
  - Groups model elements into a name space
  - Often represented in tool browser
  - Supports model configuration management (check-in/out)
- Model can be organized in multiple ways
  - By System hierarchy (e.g., enterprise, system, component)
  - By diagram kind (e.g., requirements, use cases, behavior)
  - Use viewpoints to augment model organization
- Package Diagrams provide a graphical depiction of the model organization and/or package content

Package Diagram Frame

- The diagram kind abbreviation for a package diagram is pkg.
- The notation of a package in the containment tree is represented by a folder icon:

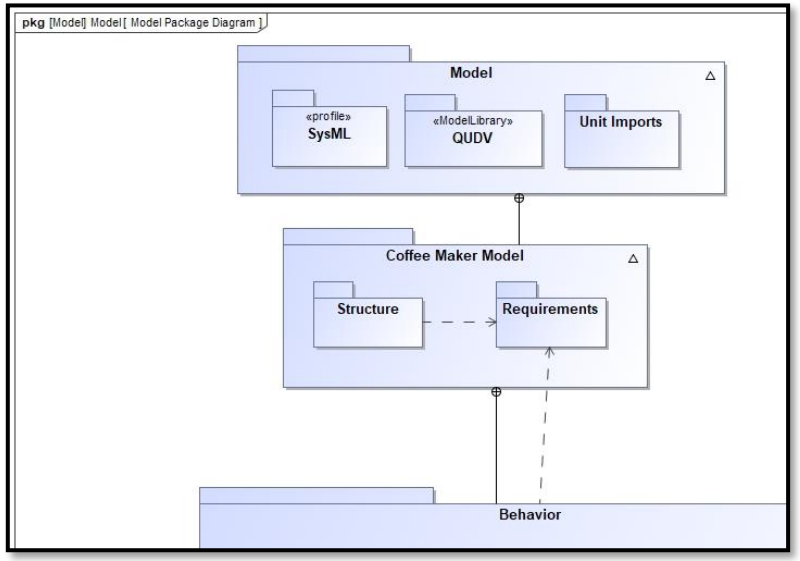


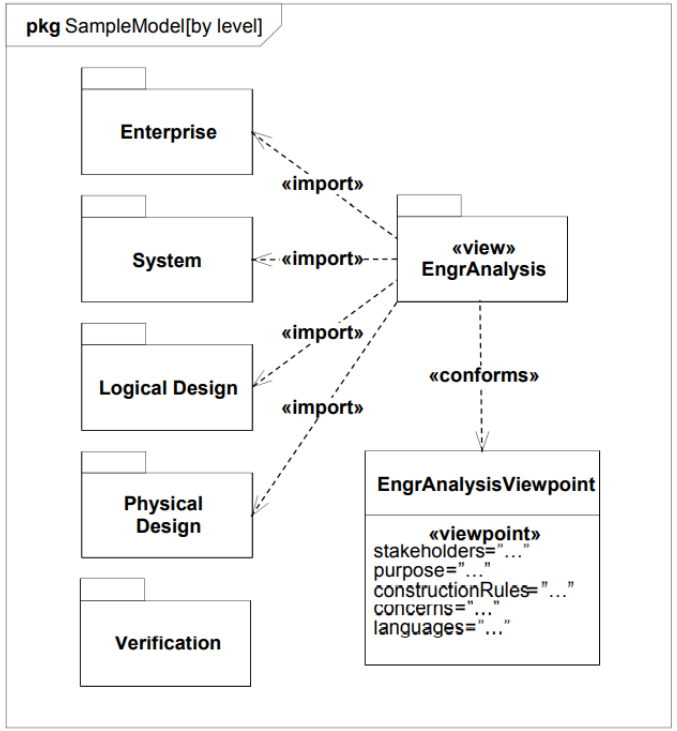
Package Diagram Kinds

- The model Element type that the diagram frame represents can be any of the following:
  - Model: kind of package that serves as the root of a containment hierarchy, top level package.
  - modelLibrary: contains a set of elements you intend to reuse in multiple models.
  - View: is a kind of package that contains a filtered subset of a model. This is used for showing a specific subset of the model to a stakeholder.
    - *Contains 5 properties:*
      - *Stakeholders*
      - *Concerns*
      - *Purpose*
      - *Languages*
      - *Methods*
  - Profile: this is a type of package that contains a set of **stereotypes**.
    - A stereotype defines a new model element by adding properties, constraints, or semantics to an existing kind of model element.
    - A profile is applied to a package, model or model library – meaning that the stereotyped elements in your profile can then be used in the locations that it is applied.

Dependencies in Package Diagrams

- Represented as a dashed line with an open arrowhead
- The dependencies in BDDs mean the same thing here
- SysML imposes no constraints on the type of elements that can be a part of a dependency relationship
- Shown on a diagram to indicate that a change in the element on the arrowhead end may mean that a change occurs within the contents of the element on the opposite end
  - <<conform>> - special type of dependency drawn from the view to the viewpoint





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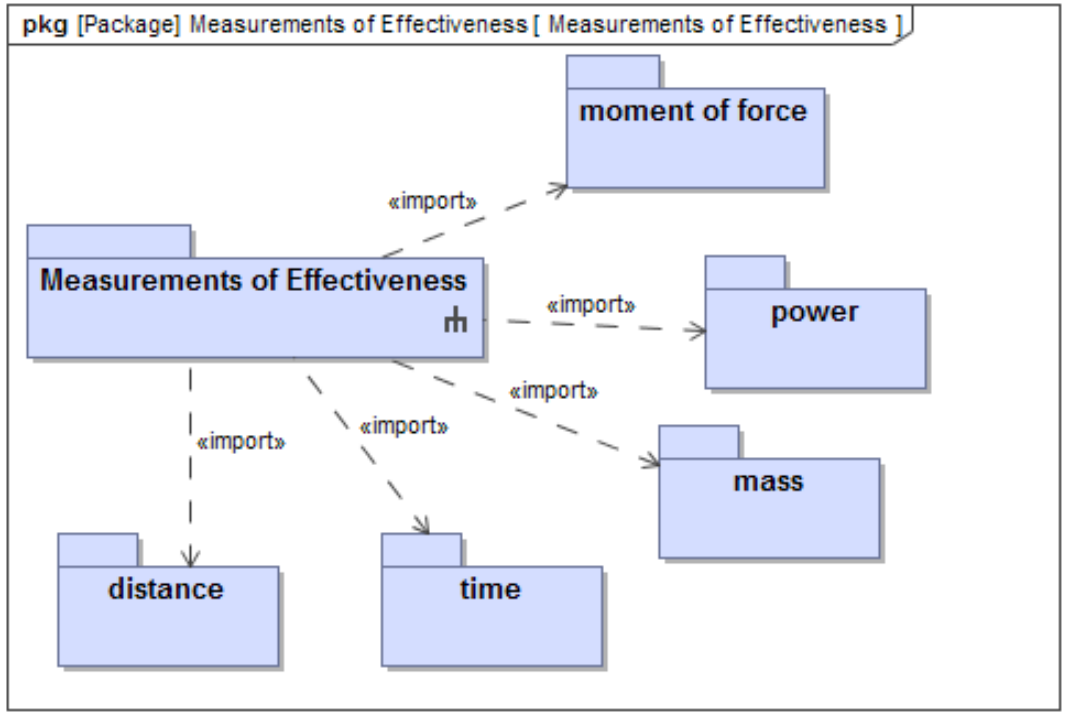
Importing Packages

- Used to import packages from other models into your model
- Package import relationship
  - Dashed line with an open arrowhead and the keyword <<import>>



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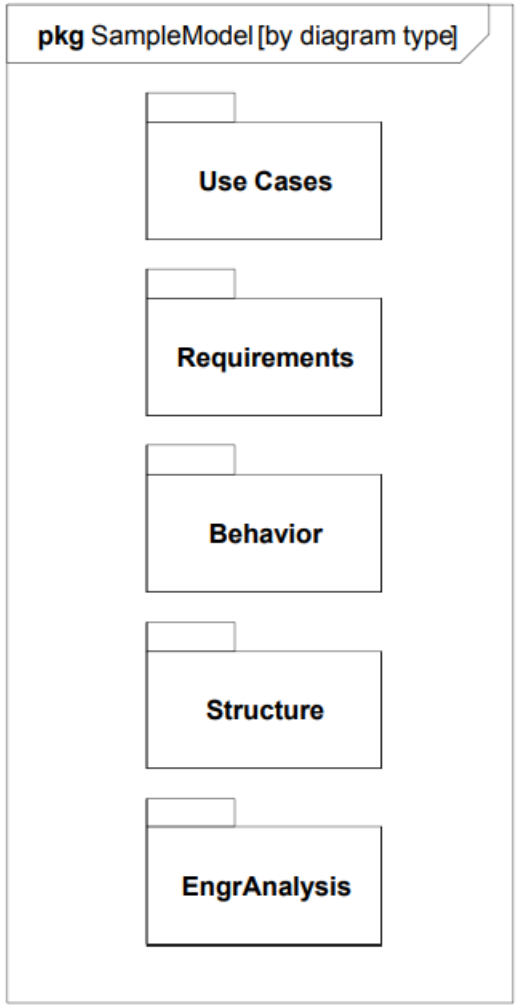
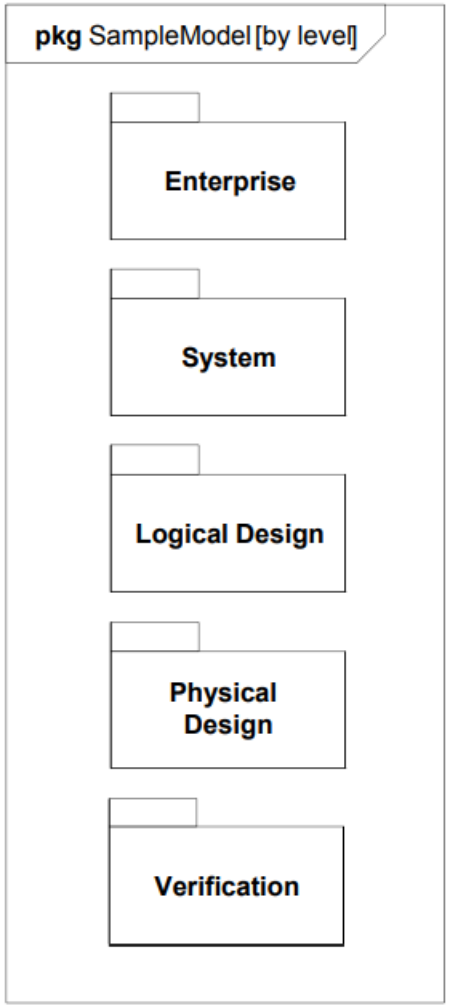
Source:https://www.google.com/search?q=sysml+package+diagram+with+dependencies&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjJgM_HjIToAhXSnuAKHZhrBXMQ_AUoAXoECAwQAw&biw=1920&bih=923#imgrc=mkUeoit_C0Sl3M

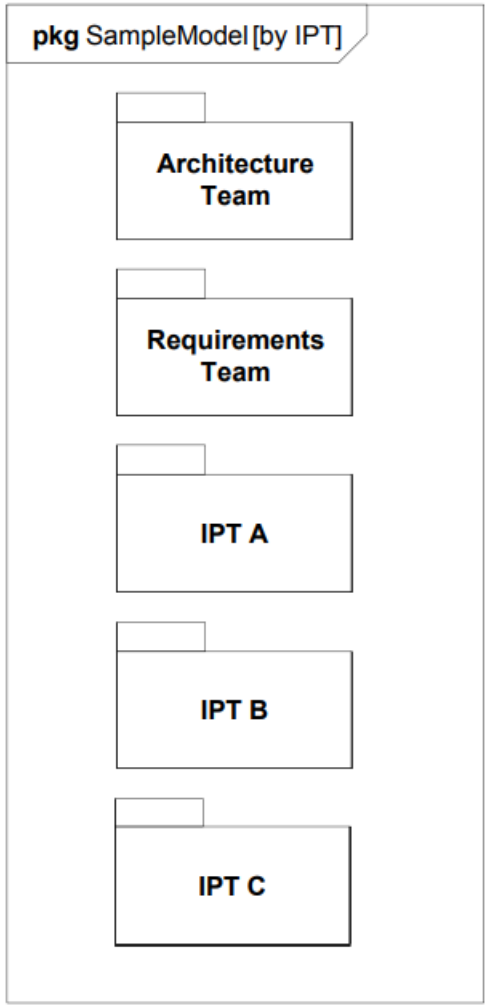
Organizing the Model with Packages



By Diagram Type



By Hierarchy



By IPT

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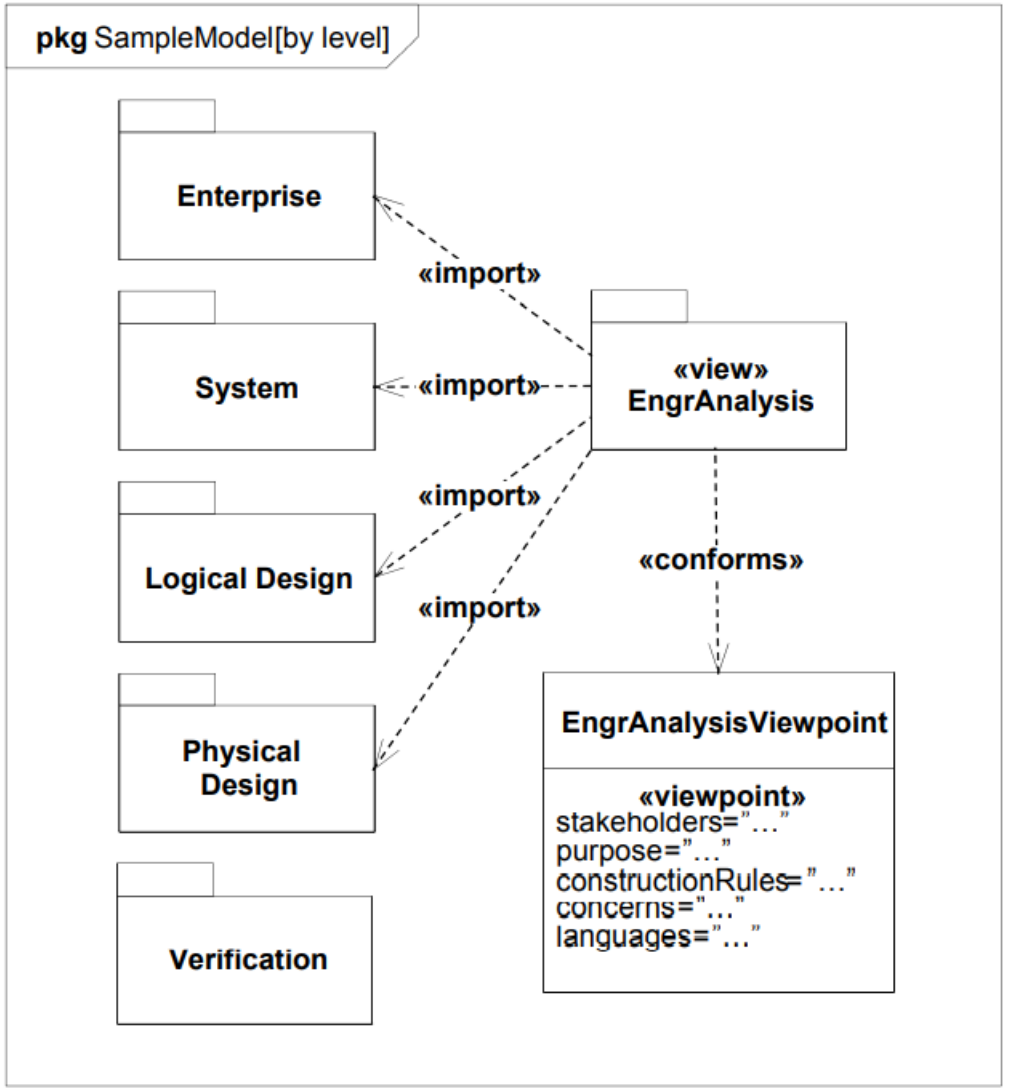
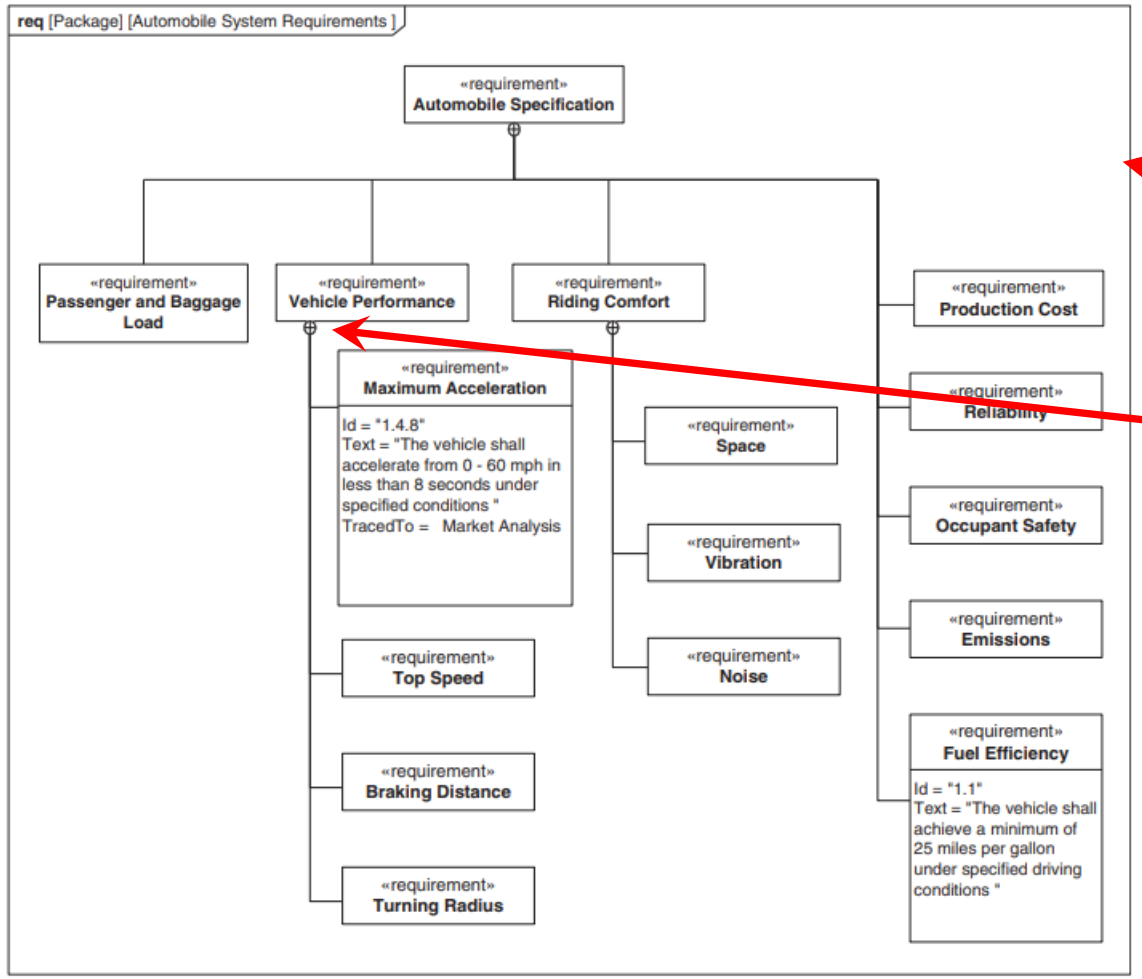
Package Diagram - Views

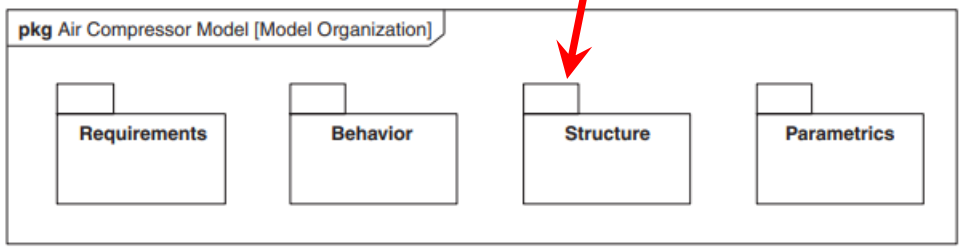
- Viewpoint represents the stakeholder perspective
- View conforms to a particular viewpoint
  - Imports model elements from multiple packages
  - Can represent a model query based on query criteria
- View and Viewpoint consistent with IEEE 1471 definitions



Package Diagram Containment Relationship



- Depicts Package Hierarchy
- Three techniques (displayed below)
  - Packages contained within 'frame' of parent package
  - Packages contained within a package
  - Crosshair pointing to the parent package



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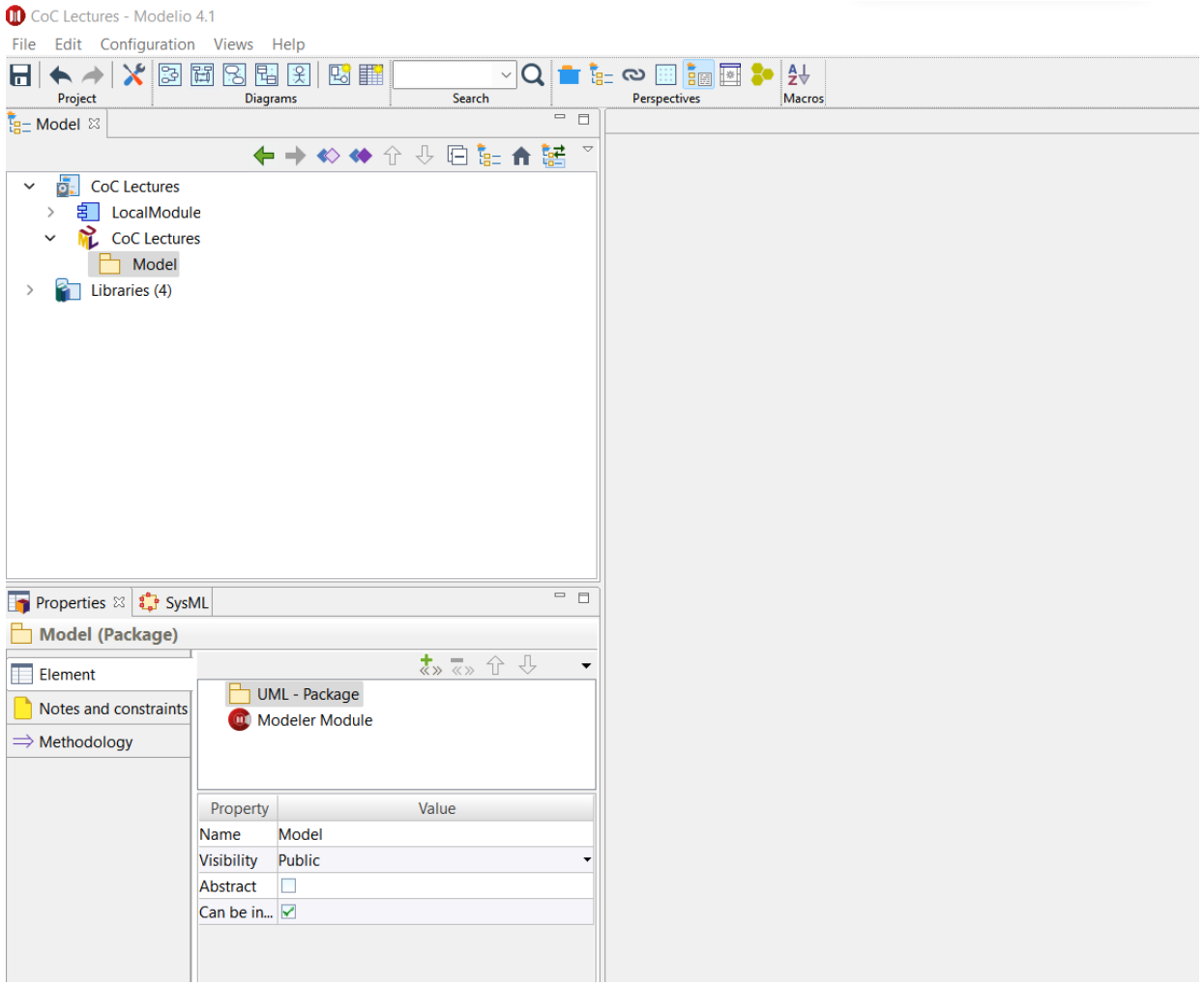
Namespace

- Namespace
  - Otherwise known as ‘where is something contained in the model’
  - A diagram’s modelElementName and modelElementType helps to identify the default namespace for the elements shown on that diagram
  - The question of Namespace can be asked 4 different ways, but they all essentially mean the same thing.
    - Assume an element named “CPU”. One could ask:
      - What is the namespace for CPU?
      - Which element contains the CPU?
      - Which element owns the CPU?
      - Where is the CPU nested in the model hierarchy?

Modelio Example of Package Diagram

- Launch Modelio 4.1
- Go to File and Create a New Project – Named “CoC Lectures” for this Example.
- Go to Model Tree and right click on CoC Lectures UML icon – Select Create Element and Select Package.
- A new package name “Model” will be created in the model as shown in the tree.



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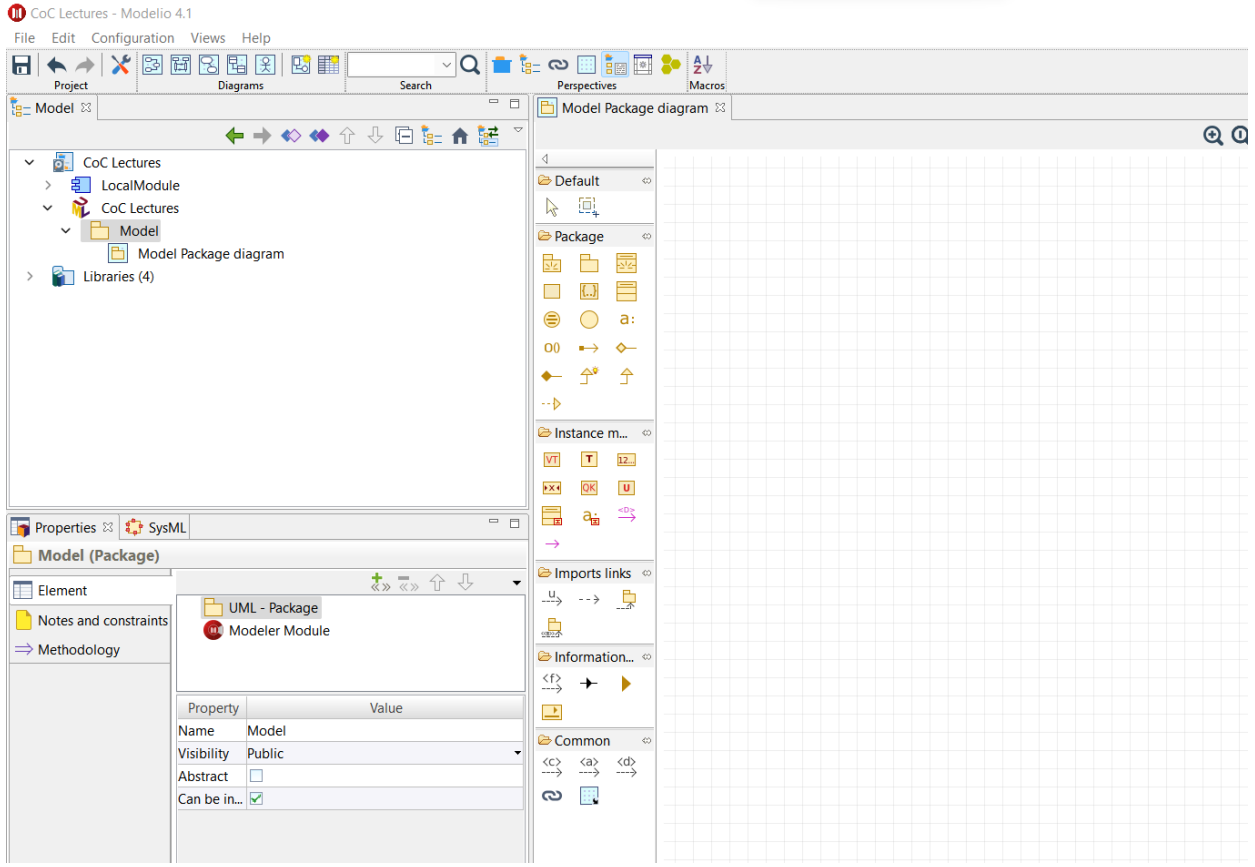
Modelio Example of Package Diagram Cont.

- Right Click on Package “Model” and
- Down select SysML Architect menu and select SysML Diagrams and Select Package Diagram.
- A Model Package Diagram will be created



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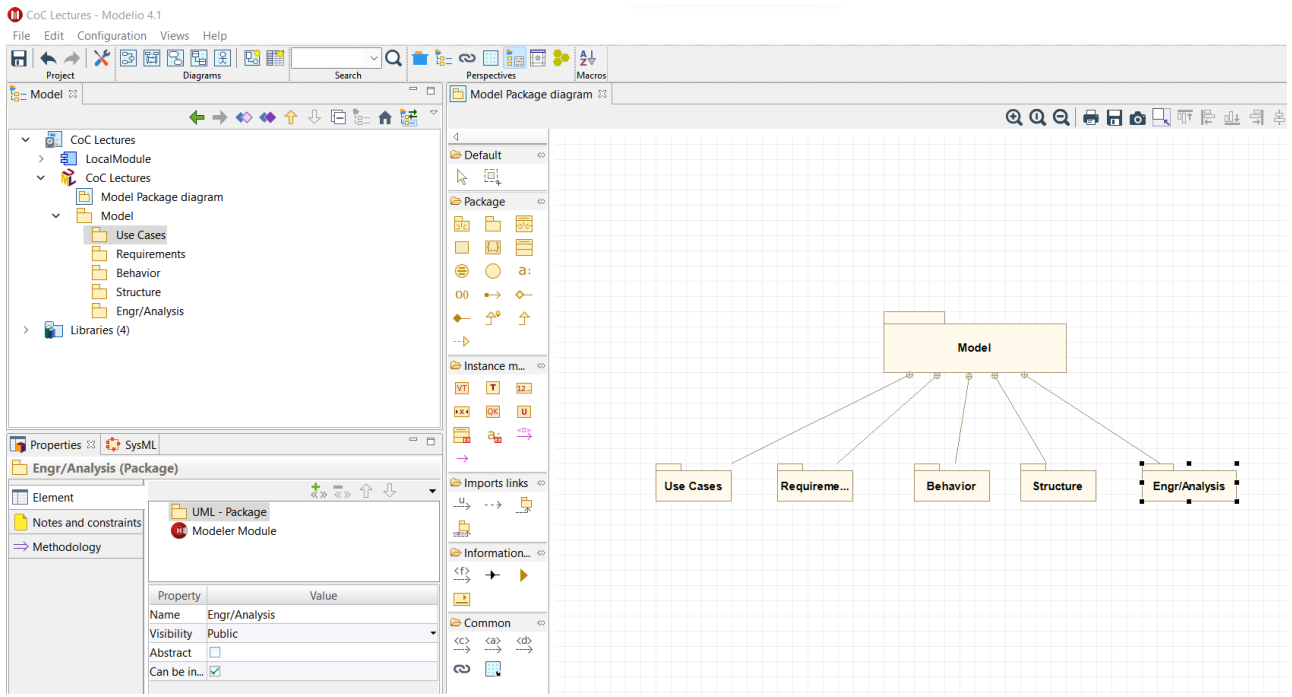
Modelio Example of Package Diagram Cont.

- Move the Model Package Diagram to branch out of CoC Lectures
- Create Sub Packages by right clicking on Model, and then selecting Create Element, then Package
- Once the Package is created, left double click to edit the name, and under value for the Name, rename to “Use Cases”
- Repeat steps 2 and 3, until you have created five packages with the following names: Use Cases, Requirements, Behavior, Structure, Engr/Analysis

- Last Left Click each package one at time, and drag to the Model Package Diagram to create the Package Diagram View



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Questions

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Summary

- Packages are used for Model Organization
- Package Diagrams are used to depict how the model is organized
- Packages can contain:
  - Other packages
  - Model elements
- Models may be organized using a variety of methods

References

- Additional information can be obtained by reviewing:
  - SysML Distilled (Delligatti)
    - Chapter 10: Package Diagrams

Lecture Review

Review Questions

Question 1

When a modeler creates a new package diagram, what abbreviation is displayed, for the diagramKind, in the diagram header?

A. package
B. pack
C. pkg
D. pd

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Which of the following can **not** be represented by the diagram frame?

A. Package
B. Block
C. Model
D. modelLibrary
E. View
F. Profile

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Question 3

What type of SysML diagram is a package diagram?

A. Behavior

B. Activity

C. Structure

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Question 4

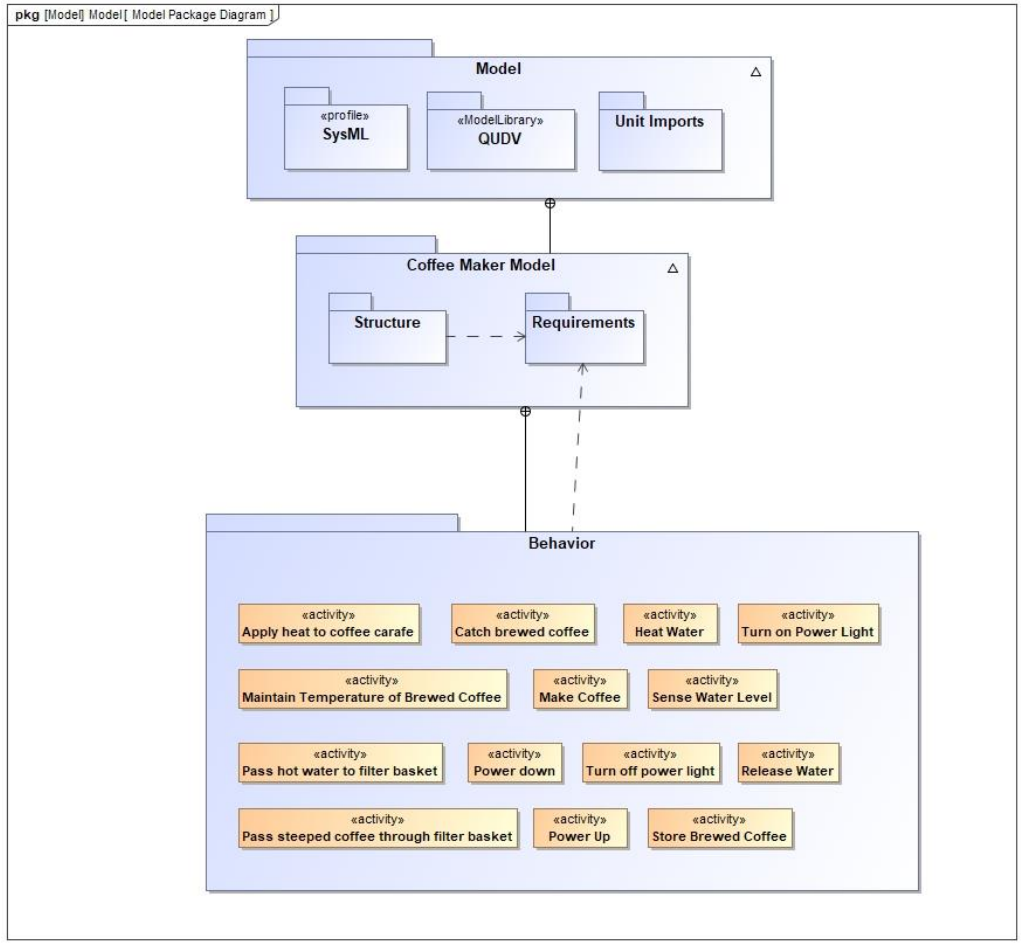
What do the dotted lines on the diagram represent?

A. Dependency: A change to the supplier element may result in a change to the client element

B. Dependency: A change to the client element may result in a change to the supplier element

C. Traceability: A change in requirements can be traced to a change in behavior

D. Traceability: A change in behavior can be traced to a change in requirements



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Question 4

What do the dotted lines on the diagram represent?

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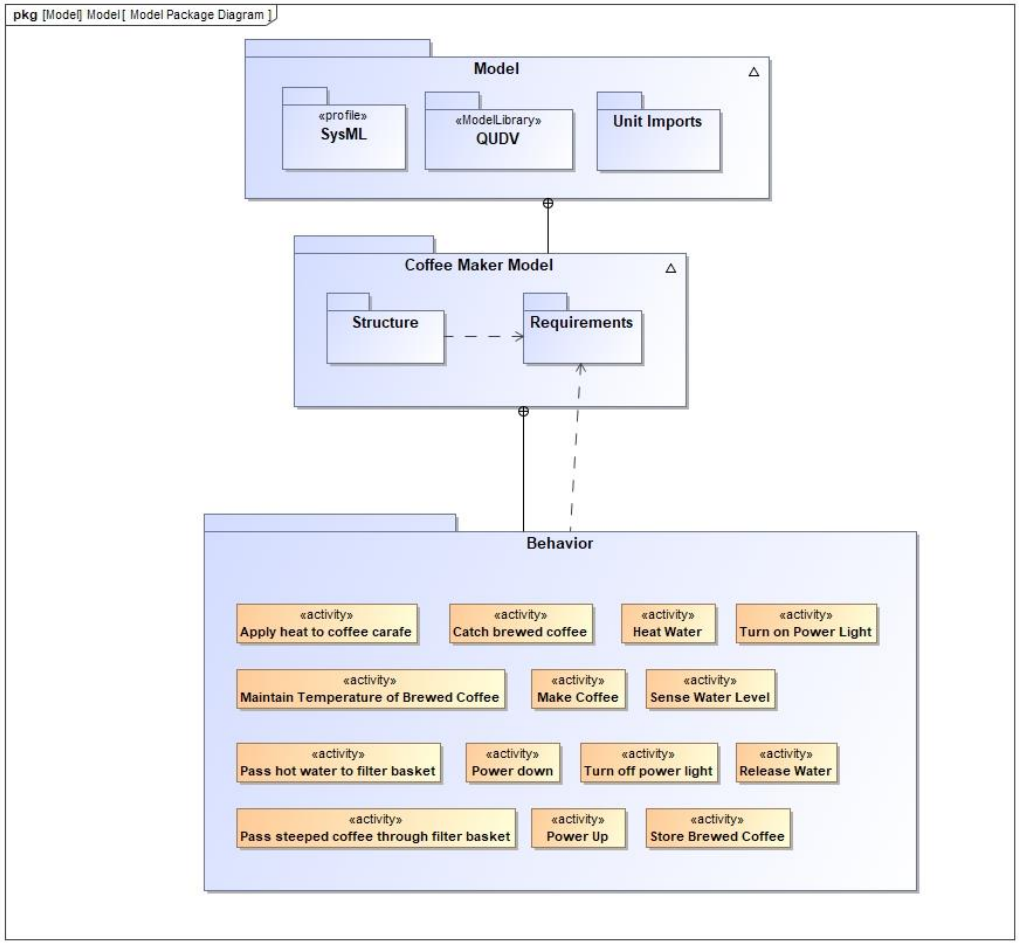

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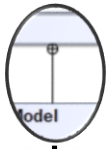
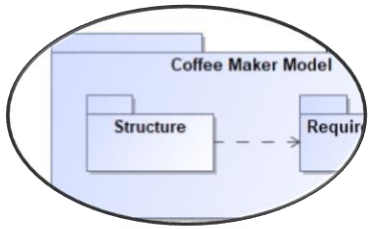
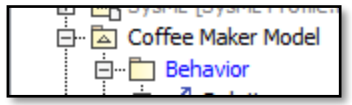
Question 5

Which of the following means that an element belongs to (ie: is contained in the namespace of) another element?

A. Cross Hair Notation : 

B. A package within a package: like structure is to Coffee Maker Model 

C. A package in the containment tree directly below another package: like Behavior is to Coffee Maker Model

D. All 3 choices are correct 

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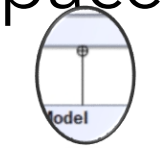

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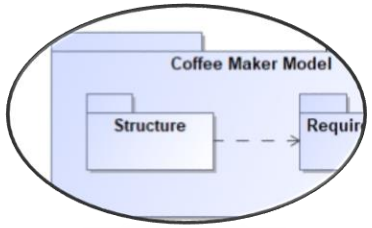

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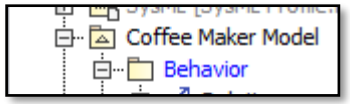

Question 6

Which of the following would you use if you wanted to be able to apply a set of stereotypes to elements in your model?

A. Profile
B. Package
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E. View