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Architecture Description

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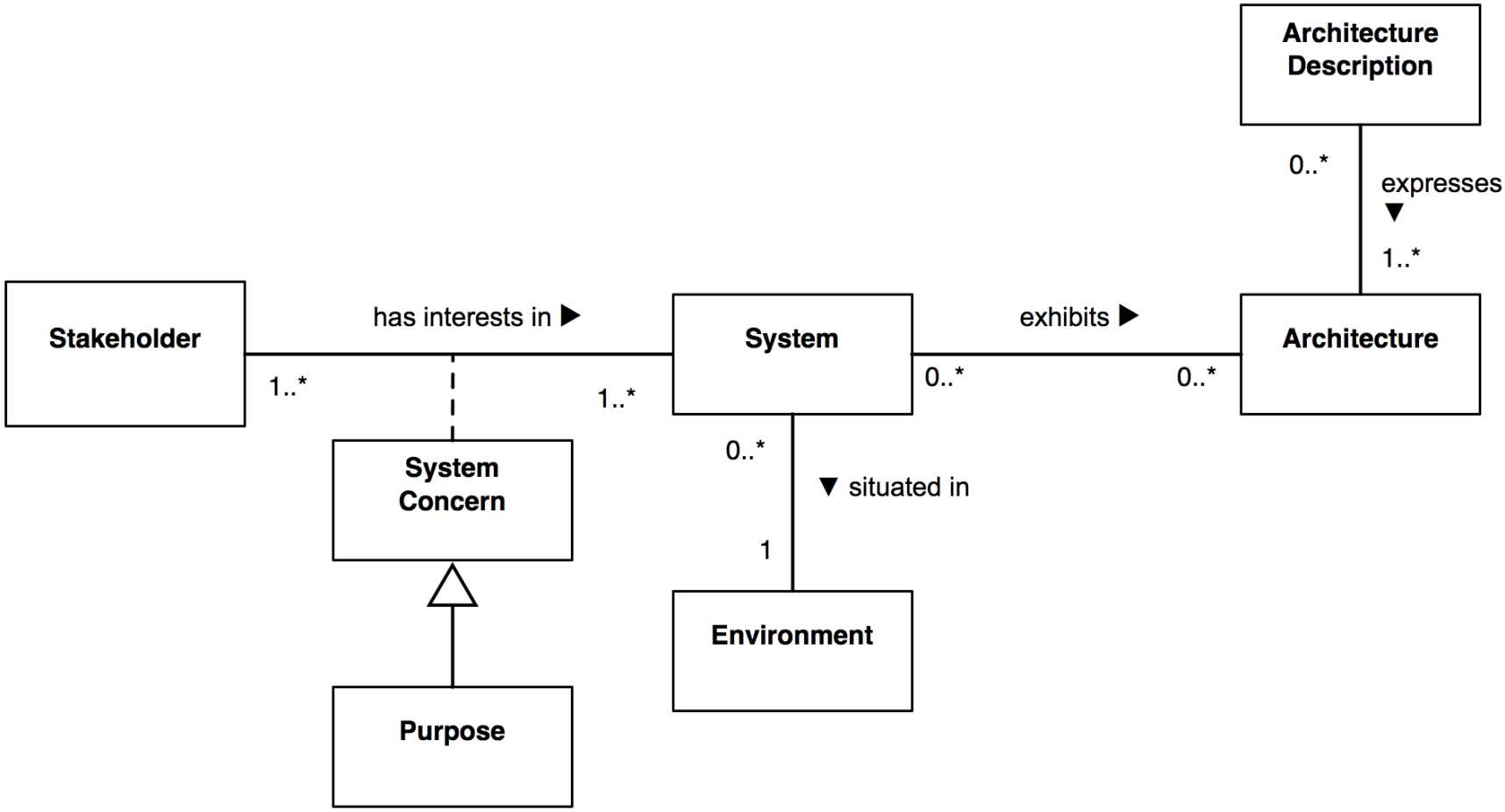
ISO/IEC/IEEE 42010 Systems and Software Engineering — Architecture Description

- International standard for architecture descriptions of systems and software.
- The original IEEE 1471 specified requirements on the contents of **architecture descriptions** of systems.
  - An architecture description (AD) expresses the architecture of a system of interest
- ISO/IEC/IEEE 42010 adds definitions and requirements on **architecture frameworks** and **architecture description languages** (ADLs)

http://www.iso-architecture.org/ieee-1471/faq.html

ISO/IEC/IEEE 42010
A Conceptual Model of Architecture Description



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Key Ideas of ISO/IEC/IEEE 42010: System

- The Standard takes no position on the question, *What is a system?*
- The term "*system*" could refer to an enterprise, a product line, a service, a subsystem, or software.
- Systems can be man-made or natural. Users of the Standard are free to employ whatever *system theory* they choose.
- The premise of the Standard is, *For a system of interest to you, the Standard provides guidance for documenting an architecture of that system.*

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Key Ideas of ISO/IEC/IEEE 42010: Architecture

- "*Architecture*" names that which is fundamental about a system; the set of essential properties of a system which determine its form, function, value, cost, and risk.
- That which is **fundamental** to a system takes several forms:
  - its **elements**: the constituents that make up the system;
  - the **relationships**: both internal and external to the system; and
  - the **principles of its design and evolution**.
- An architecture is a *conception of a system* – i.e., it is in the human mind. An architecture may exist without ever being written down.

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Key Ideas of ISO/IEC/IEEE 42010: Architecture Description

- An *architecture description* (AD) is an artifact that expresses an Architecture to share with others.
  - An AD is what is written down as a concrete work product. It could be a document, a repository or a collection of artifacts used to define and document an architecture
  - Architects and other system stakeholders use Architecture Descriptions to understand, analyze and compare Architectures, and often as "blueprints" for planning and construction.

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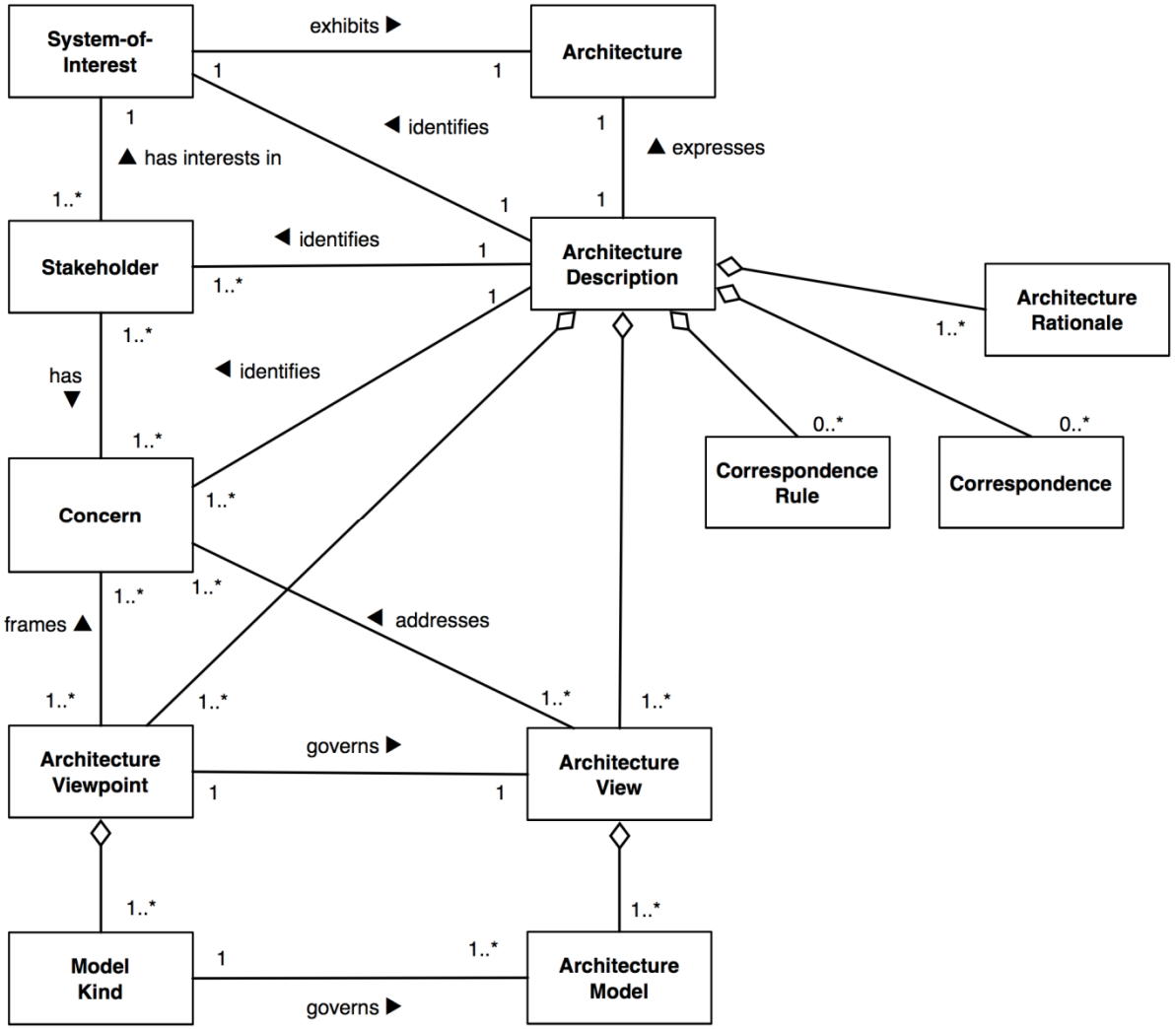
Key Ideas of ISO/IEC/IEEE 42010 Environment

- Every System exists in its *Environment*, it acts upon that Environment and vice versa.
- A System's Environment determines the range of influences upon the system. It include developmental, operational, technical, political, regulatory, and *all other influences which can affect the architecture*.
- The environment of a system is understood through the identification of the *stakeholders* of the system and their concerns.
  - A *Concern* is any interest in the system.
    - **Examples of System Concerns**: agility, behavior, business goals, business strategy, complexity, customer experience, flexibility, functionality, maintainability, purpose, quality of service, regulatory compliance, security, structure.
  - *Stakeholders* are individuals, groups or organizations holding concerns for the System.
    - **Examples of Stakeholders**: client, owner, user, operator, maintainer, developers, suppliers, regulator, auditor, architect.

The Core of Architecture Description



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Architecture Views and Viewpoints

- View:
  - Part of an architecture description that
    - addresses a set of related concerns and
    - is addressed to a set of stakeholder
  - A view is specified by means of a viewpoint
- Viewpoint …
  - prescribes the concepts, models, analysis techniques, and visualizations that are provided by the view

A *view* is what you see and
a *viewpoint* is where you are looking from

Architecture Viewpoints and Views

- An *Architecture Viewpoint* is a set of conventions for constructing, interpreting, using and analyzing one type of Architecture View. Examples of viewpoints: operational, systems, technical, logical, deployment, process, information.
- An *Architecture View* in an AD expresses the Architecture of the System from the perspective of one or more Stakeholders to address specific Concerns, using the conventions established by its viewpoint. An Architecture View consists of one or more Architecture Models.

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Architecture Models

- A view is comprised of *Architecture Models*. Each model is constructed in accordance with the conventions established by its Model Kind, typically defined as part of its governing viewpoint. Models provide a means for sharing details between views.
- A *Model Kind* defines the conventions for a type of Architecture Model.

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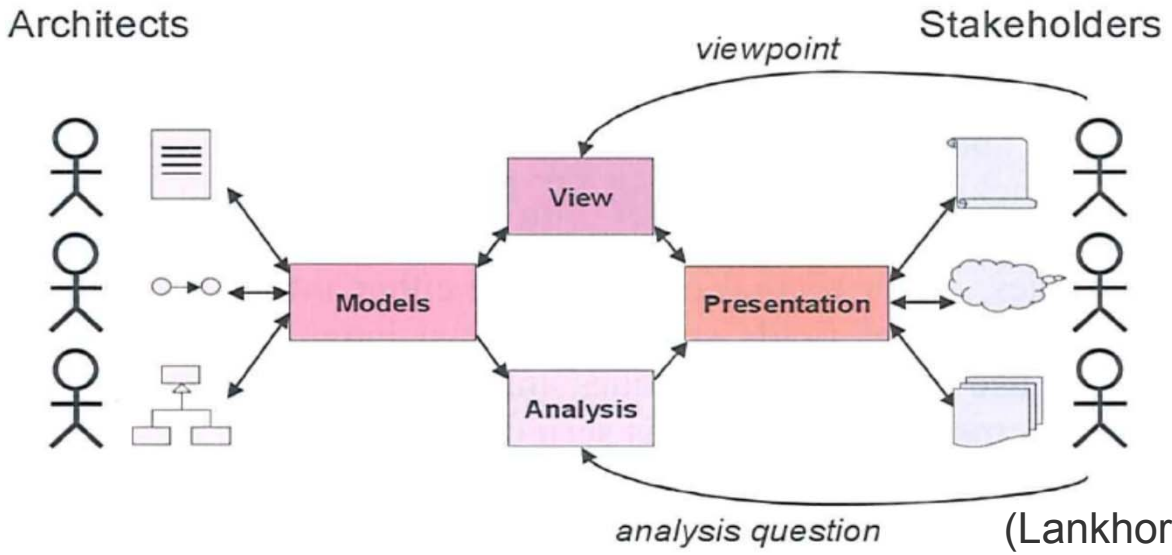
Communicating about Architecture

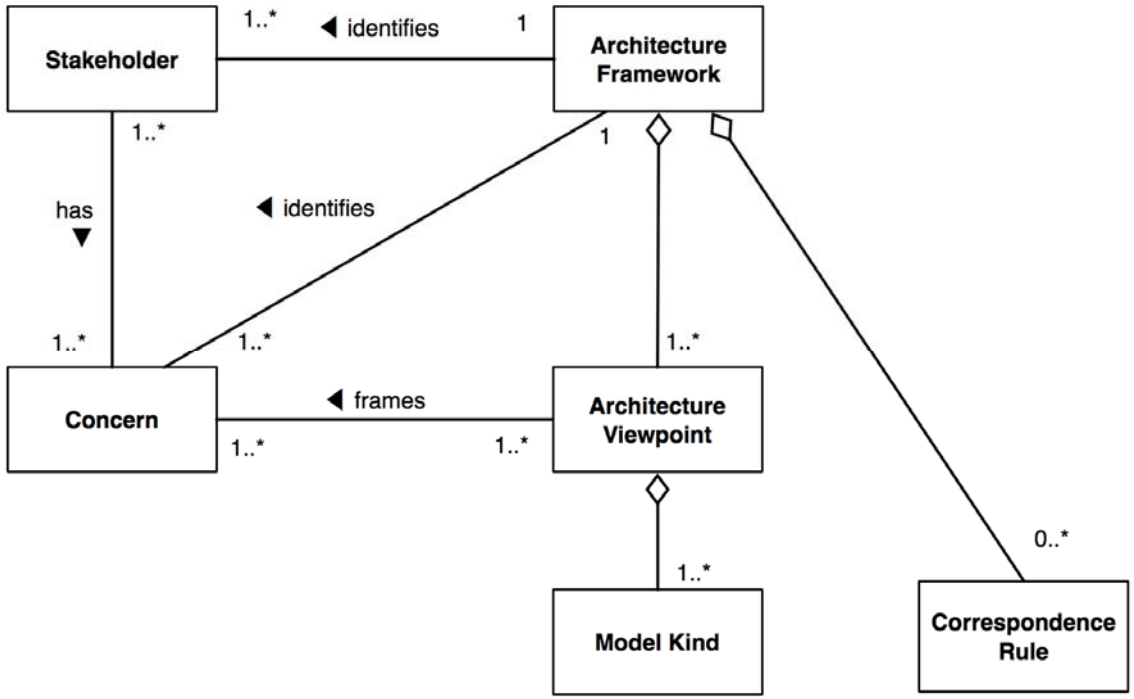
- Viewpoints are designed for the purpose of communicating certain aspects of an architecture.
- Viewpoints are a means to focus on particular aspects of the architecture;
- the aspects are determined by the concerns of the stakeholder with whom communication takes place.
- The architect informs the stakeholders, and the stakeholders give feedback on the presented aspects.



(Lankhorst et al. 2005, p. 4)

Architecture Framework

- An *Architecture Framework* establishes a common practice for creating, interpreting, analyzing and using architecture descriptions within a particular domain of application or stakeholder community.



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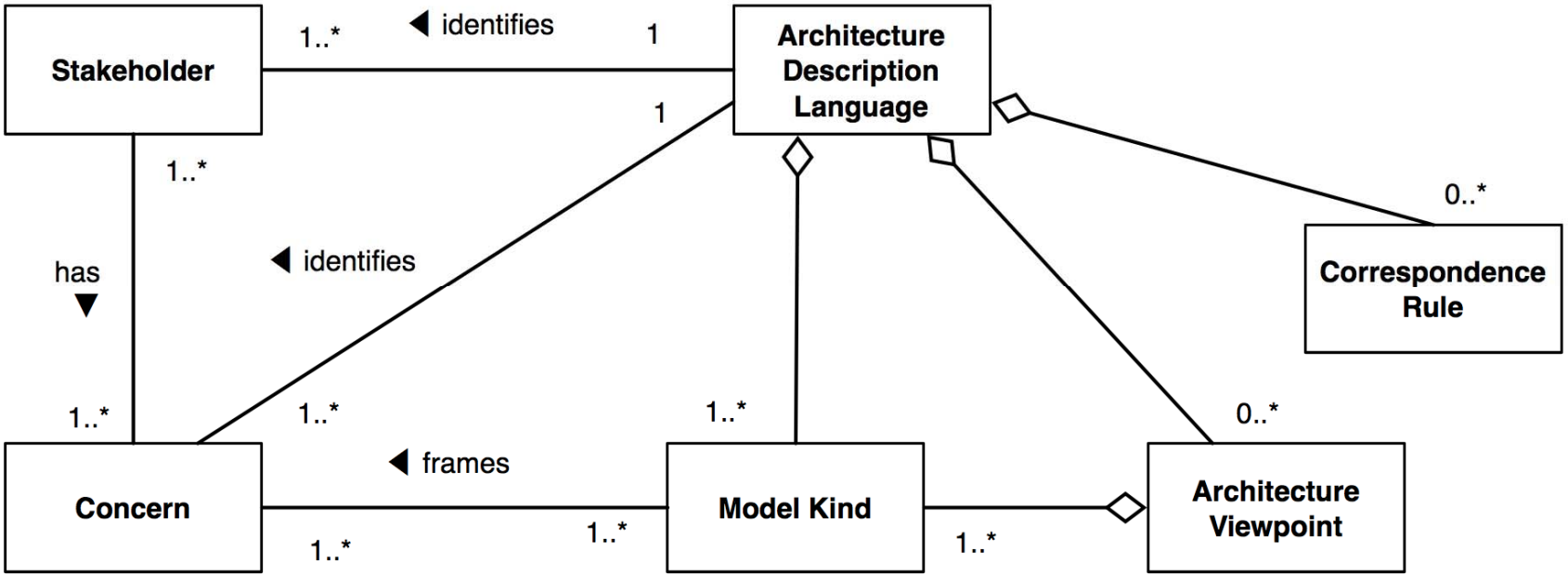
Architecture Description Language

- An *Architecture Description Language (ADL)* is any form of expression for use in Architecture Descriptions. An ADL might include a single Model Kind, a single viewpoint or multiple viewpoints. Examples of ADLs: SysML, ArchiMate



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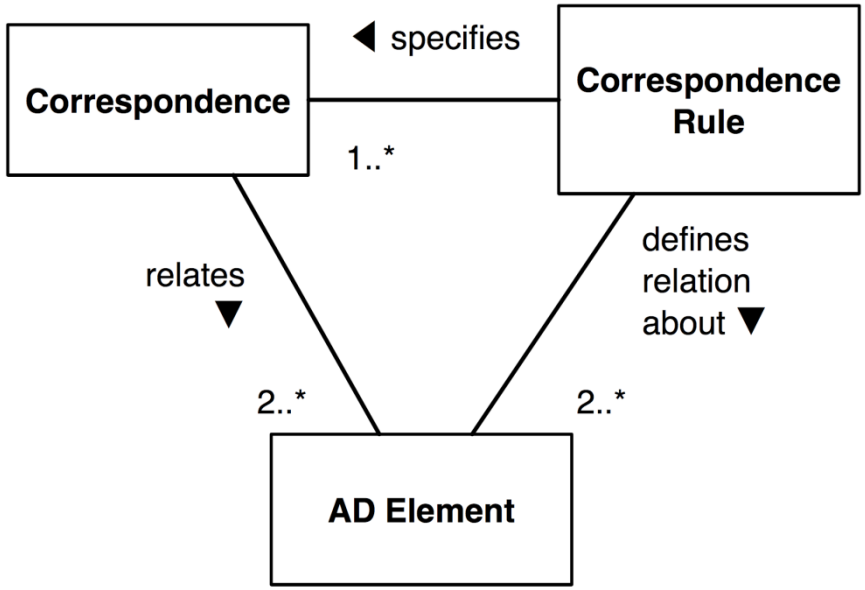
AD Elements and Correspondences

- Any item in an AD is considered an *AD Element*.
- *Correspondences* express a relation between AD Elements.
- *Correspondence Rules* enforce relations within an Architecture Description or between Architecture Descriptions.



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