national center for ontological research
ncor

University at Buffalo
The State University of New York

Design Patterns: Practice

John Beverley

Assistant Professor, *University at Buffalo*
Co-Director, National Center for Ontological Research
Affiliate Faculty, *Institute of Artificial Intelligence and Data Science*

Outline

- Refresher on Guidelines
- Dogmatists, Academics, and Skeptics
- Design Pattern

Outline

- Refresher on Guidelines
- Dogmatists, Academics, and Skeptics
- Design Pattern

Rules of Thumb

- When building a design pattern, describe:

1. Material entities within scope, i.e. **Material Entity**
2. Qualities these material entities have, i.e. **Quality**
3. What these material entities can do, i.e. **Process**
4. What properties underwrite what they can do, i.e. **Realizable Entity**
5. Where these material entities and their boundaries are located, e.g. **Immaterial Entity**
6. When these entities exist, e.g. **Temporal Region**
7. Information we use to talk about 1-6, i.e. **Generically Depedent Continuant**

Outline

- Refresher on Guidelines
- Dogmatists, Academics, and Skeptics
- Design Pattern

Dogmatist

- The **dogmatist** takes a positive position to defend

- For example, a dogmatist might defend the claim “There is a god” or “Trade tariffs are economically feasible.”

Dogmatist & Academic

- The **dogmatist** takes a positive position to defend
- For example, a dogmatist might defend the claim "There is a god" or "Trade tariffs are economically feasible."
- The **academic** takes a negative position to defend
- For example, an academic might defend the claim "There is no god" or "Trade tariffs are not economically feasible."

Skeptic

- The **skeptic** claims that both dogmatists and academics are mistaken
- The skeptic will seek to undermine positive arguments and negative arguments
- A sophisticated skeptic will do this in **a balanced way**, whenever the academic has the advantage, the skeptic will support the dogmatist, and vice versa

Practice Makes Perfect

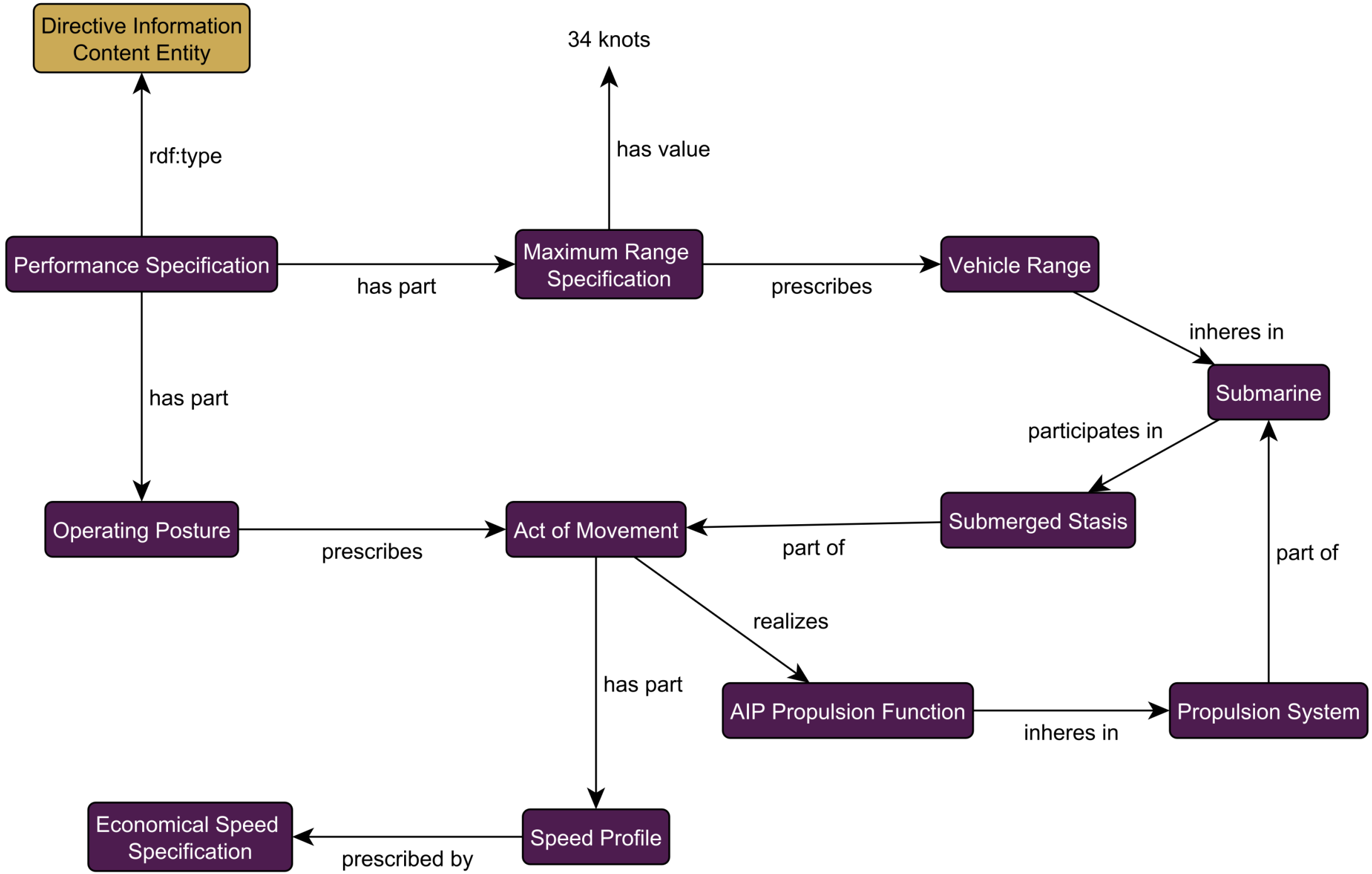
- We will practice refining design patterns, with a slight twist
- Organize into groups of at least 3
- At least one individual plays the role of **dogmatist**, one of **academic**, and one of **skeptic**

Play the Game

- I will provide the class with a design pattern to discuss
- Dogmatists will be tasked with **defending the design pattern choices**, e.g. specific classes or relationships, placement within the hierarchy, etc.
- Academics will seek to **undermine justification** for such choices
- Skeptics will **play both sides**...

Outline

- Refresher on Guidelines
- Dogmatists, Academics, and Skeptics
- Design Pattern


Directive Information Content Entity
34 knots
rdf:type
has value
Performance Specification
has part
Maximum Range Specification
prescribes
Vehicle Range
inheres in
Submarine
has part
participates in
Operating Posture
prescribes
Act of Movement
part of
Submerged Stasis
part of
realizes
has part
AIP Propulsion Function
inheres in
Propulsion System
Economical Speed Specification
prescribed by
Speed Profile

Appendix A

Competency Question

Towards a Cyber Information Ontology

David LIMBAUGH[a], Mark JENSEN[a,b], and John BEVERLEY[a,c,1]

[a] *National Center for Ontological Research*
[b] *Customs and Border Protection*
[c] *Institute for Artificial Intelligence and Data Science*

Abstract. This paper introduces a set of terms that are intended to act as an interface between cyber ontologies (like a file system ontology or a data fusion ontology) and top- and mid-level ontologies, specifically Basic Formal Ontology and the Common Core Ontologies. These terms center on what makes cyberinformation management unique: numerous acts of copying items of information, the aggregates of copies that result from those acts, and the faithful members of those aggregates that represent all other members.

Keywords. ontology, information, cyber information, Basic Formal Ontology, Common Core Ontologies

What entities are involved in the spread of information from one information bearer to another?

Competency Question

Towards a Cyber Information Ontology

David LIMBAUGH[a], Mark JENSEN[a,b], and John BEVERLEY[a,c,1]

[a] *National Center for Ontological Research*
[b] *Customs and Border Protection*
[c] *Institute for Artificial Intelligence and Data Science*

Abstract. This paper introduces a set of terms that are intended to act as an interface between cyber ontologies (like a file system ontology or a data fusion ontology) and top- and mid-level ontologies, specifically Basic Formal Ontology and the Common Core Ontologies. These terms center on what makes cyberinformation management unique: numerous acts of copying items of information, the aggregates of copies that result from those acts, and the faithful members of those aggregates that represent all other members.

Keywords. ontology, information, cyber information, Basic Formal Ontology, Common Core Ontologies

What entities are involved in the spread of information from one information bearer to another?

SELECT AND MODEL ONE OF THE FOLLOWING

An email is sent from a laptop to a personal computer.

Information stored on a solid-state drive is displayed on a monitor.

A file system snapshot is stored on a backup drive.

Competency Question

Towards a Cyber Information Ontology

David LIMBAUGH[a], Mark JENSEN[a,b], and John BEVERLEY[a,c,1]

[a] *National Center for Ontological Research*
[b] *Customs and Border Protection*
[c] *Institute for Artificial Intelligence and Data Science*

Abstract. This paper introduces a set of terms that are intended to act as an interface between cyber ontologies (like a file system ontology or a data fusion ontology) and top- and mid-level ontologies, specifically Basic Formal Ontology and the Common Core Ontologies. These terms center on what makes cyberinformation management unique: numerous acts of copying items of information, the aggregates of copies that result from those acts, and the faithful members of those aggregates that represent all other members.

Keywords. ontology, information, cyber information, Basic Formal Ontology, Common Core Ontologies

What entities are involved in the spread of information from multi-modal information bearers to a target?

Competency Question

Towards a Cyber Information Ontology

David LIMBAUGH[a], Mark JENSEN[a,b], and John BEVERLEY[a,c,1]

[a] *National Center for Ontological Research*
[b] *Customs and Border Protection*
[c] *Institute for Artificial Intelligence and Data Science*

Abstract. This paper introduces a set of terms that are intended to act as an interface between cyber ontologies (like a file system ontology or a data fusion ontology) and top- and mid-level ontologies, specifically Basic Formal Ontology and the Common Core Ontologies. These terms center on what makes cyberinformation management unique: numerous acts of copying items of information, the aggregates of copies that result from those acts, and the faithful members of those aggregates that represent all other members.

Keywords. ontology, information, cyber information, Basic Formal Ontology, Common Core Ontologies

What entities are involved in the spread of information from multi-modal information bearers to a target?

SELECT AND MODEL ONE OF THE FOLLOWING

Acoustic and image traffic data are sent from field sensors to a controller which adjusts the timing of traffic light changes.

Bathymetric, meteorological, and temperature data are sent to a dataset for tracking marine life.

Competency Question

Towards a Cyber Information Ontology

David LIMBAUGH[a], Mark JENSEN[a,b], and John BEVERLEY[a,c,1]

[a] *National Center for Ontological Research*
[b] *Customs and Border Protection*
[c] *Institute for Artificial Intelligence and Data Science*

Abstract. This paper introduces a set of terms that are intended to act as an interface between cyber ontologies (like a file system ontology or a data fusion ontology) and top- and mid-level ontologies, specifically Basic Formal Ontology and the Common Core Ontologies. These terms center on what makes cyberinformation management unique: numerous acts of copying items of information, the aggregates of copies that result from those acts, and the faithful members of those aggregates that represent all other members.

Keywords. ontology, information, cyber information, Basic Formal Ontology, Common Core Ontologies

What relationship exists among information bearers participating in the spread of information from a source?

Competency Question

Towards a Cyber Information Ontology

David LIMBAUGH[a], Mark JENSEN[a,b], and John BEVERLEY[a,c,1]

[a] *National Center for Ontological Research*
[b] *Customs and Border Protection*
[c] *Institute for Artificial Intelligence and Data Science*

Abstract. This paper introduces a set of terms that are intended to act as an interface between cyber ontologies (like a file system ontology or a data fusion ontology) and top- and mid-level ontologies, specifically Basic Formal Ontology and the Common Core Ontologies. These terms center on what makes cyberinformation management unique: numerous acts of copying items of information, the aggregates of copies that result from those acts, and the faithful members of those aggregates that represent all other members.

Keywords. ontology, information, cyber information, Basic Formal Ontology, Common Core Ontologies

What relationship exists among information bearers participating in the spread of information from a source?

SELECT AND MODEL ONE OF THE FOLLOWING

Relationships among 10 machines that receive an email from a single machine.

Relationships among distinct drives storing identical snapshots of a system.

Competency Question

Towards a Cyber Information Ontology

David LIMBAUGH[a], Mark JENSEN[a,b], and John BEVERLEY[a,c,1]

[a] *National Center for Ontological Research*
[b] *Customs and Border Protection*
[c] *Institute for Artificial Intelligence and Data Science*

Abstract. This paper introduces a set of terms that are intended to act as an interface between cyber ontologies (like a file system ontology or a data fusion ontology) and top- and mid-level ontologies, specifically Basic Formal Ontology and the Common Core Ontologies. These terms center on what makes cyberinformation management unique: numerous acts of copying items of information, the aggregates of copies that result from those acts, and the faithful members of those aggregates that represent all other members.

Keywords. ontology, information, cyber information, Basic Formal Ontology, Common Core Ontologies

What entities are involved in spreading information according to standard transmission protocols?

Competency Question

Towards a Cyber Information Ontology

David LIMBAUGH[a], Mark JENSEN[a,b], and John BEVERLEY[a,c,1]

[a] *National Center for Ontological Research*
[b] *Customs and Border Protection*
[c] *Institute for Artificial Intelligence and Data Science*

Abstract. This paper introduces a set of terms that are intended to act as an interface between cyber ontologies (like a file system ontology or a data fusion ontology) and top- and mid-level ontologies, specifically Basic Formal Ontology and the Common Core Ontologies. These terms center on what makes cyberinformation management unique: numerous acts of copying items of information, the aggregates of copies that result from those acts, and the faithful members of those aggregates that represent all other members.

Keywords. ontology, information, cyber information, Basic Formal Ontology, Common Core Ontologies

What entities are involved in spreading information according to standard transmission protocols?

SELECT AND MODEL ONE OF THE FOLLOWING

A password is submitted over an encrypted Secure Socket Layer connection.

A password is submitted over an unencrypted HTTP connection.

Competency Question

Towards a Cyber Information Ontology

David LIMBAUGH[a], Mark JENSEN[a,b], and John BEVERLEY[a,c,1]

[a] *National Center for Ontological Research*
[b] *Customs and Border Protection*
[c] *Institute for Artificial Intelligence and Data Science*

Abstract. This paper introduces a set of terms that are intended to act as an interface between cyber ontologies (like a file system ontology or a data fusion ontology) and top- and mid-level ontologies, specifically Basic Formal Ontology and the Common Core Ontologies. These terms center on what makes cyberinformation management unique: numerous acts of copying items of information, the aggregates of copies that result from those acts, and the faithful members of those aggregates that represent all other members.

Keywords. ontology, information, cyber information, Basic Formal Ontology, Common Core Ontologies

What relationships exist among information entities under version control which correspond to a single, current, version?

Competency Question

Towards a Cyber Information Ontology

David LIMBAUGH[a], Mark JENSEN[a,b], and John BEVERLEY[a,c,1]

[a] *National Center for Ontological Research*
[b] *Customs and Border Protection*
[c] *Institute for Artificial Intelligence and Data Science*

Abstract. This paper introduces a set of terms that are intended to act as an interface between cyber ontologies (like a file system ontology or a data fusion ontology) and top- and mid-level ontologies, specifically Basic Formal Ontology and the Common Core Ontologies. These terms center on what makes cyberinformation management unique: numerous acts of copying items of information, the aggregates of copies that result from those acts, and the faithful members of those aggregates that represent all other members.

Keywords. ontology, information, cyber information, Basic Formal Ontology, Common Core Ontologies

What relationships exist among information entities under version control which correspond to a single, current, version?

SELECT AND MODEL ONE OF THE FOLLOWING

Two authors collaborating on a paper using Google Docs.

A developer accessing code on a GitHub repository, from distinct machines.

BFO: Basic Formal Ontology

J. Neil Otte[1], John Beverley[2], and Alan Ruttenberg[3]

[1]Johns Hopkins University Applied Physics Laboratory
[2]Northwestern University
[3]University at Buffalo

CASE 6: *A marriage is a contract that is regulated by civil and social constraints. These constraints can change but the meaning of marriage continues over time.*

Marriage License

- In the U.S., states impose *eligibility requirements on individuals*, e.g. individuals entering marriage must be able to consent and above a certain age.

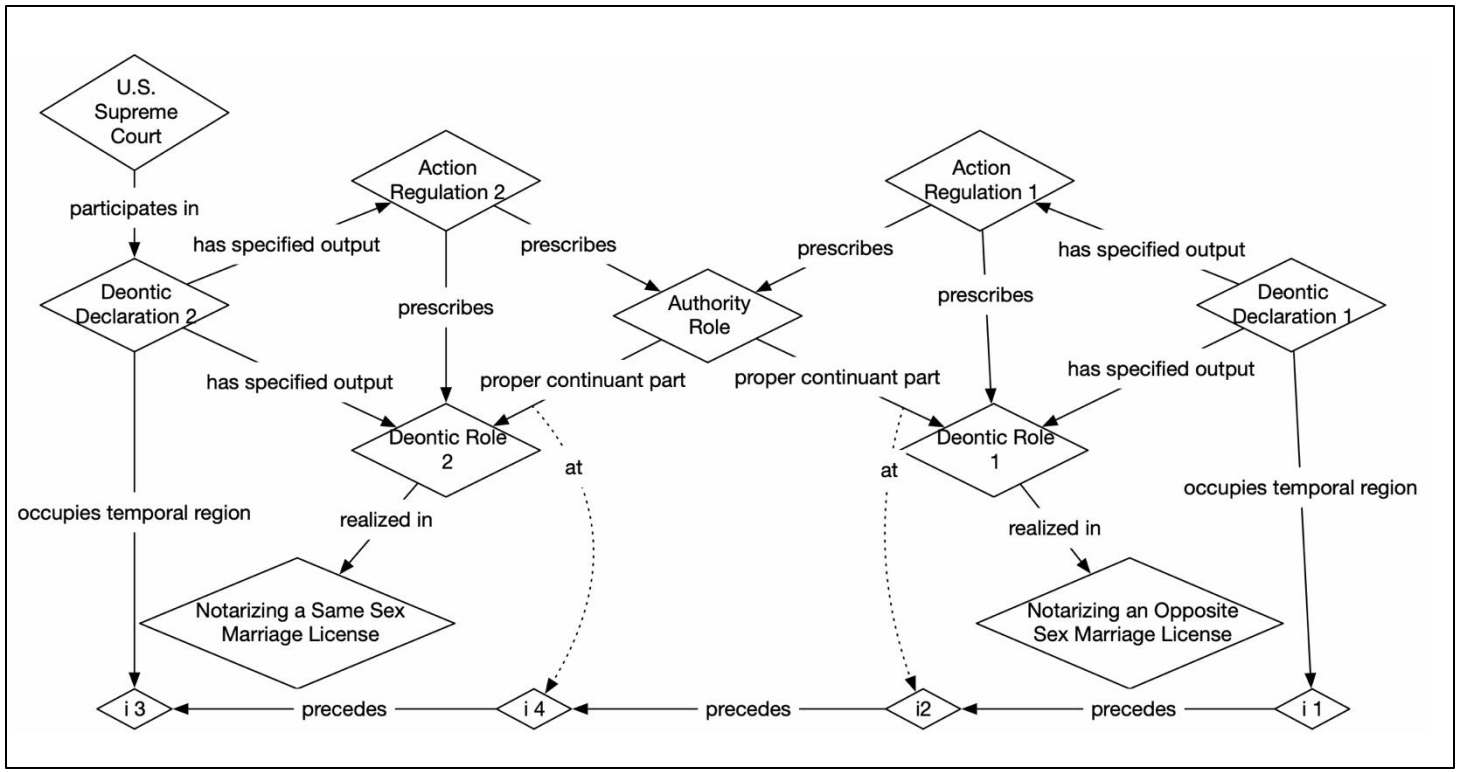
- States also impose *eligibility requirements on the couple*, e.g. one member of the union must be a U.S. citizen

Marriage License

- Before 1967, several states prohibited interracial marriage; until 2015 several prohibited same-sex marriage.

- Governments grant *obligations to spouses* - married partners bear financial responsibilities to one another - and *privileges* - married partners are not required to testify against one another in court.

CASE 6: *A marriage is a contract that is regulated by civil and social constraints. These constraints can change but the meaning of marriage continues over time.*



Class	Definition or Elucidation
document	a collection of information content entities intended to be understood together as a whole
government	an organization that exercises executive, legislative, or judicial authority over a region
marriage license	a document issued by a government, which legally binds agents as spouses, and invests them with associated **instances of** deontic role
deontic declaration	a social act that creates or **revokes** a deontic role
social act	a planned process that is carried out by a person or an organization, and is self-generated, directed towards another person or an aggregate of persons, an organization or an aggregate of organizations, and that needs to be perceived
deontic role	a role that **inheres in** a person and that is externally grounded in the normative expectations that other persons within a social context have concerning how that person should behave
action regulation	an information content entity that **prescribes** an act as required, prohibited, or permitted, and is the **output of** an act that **realizes** some authority role
authority role	a role that is **realized** by actions that create, modify, transfer, or eliminate action regulations or other authority roles, and **inheres in** an agent in virtue of collective acceptance of that agent's ability to issue binding directives