INFO/CS 4302
Web Information Systems

FT 2012

Week 9 : Linked Data Technologies (SKOS)

- Bernhard Haslhofer -

Plan for today...

- Recap

- Discussion Homework 7

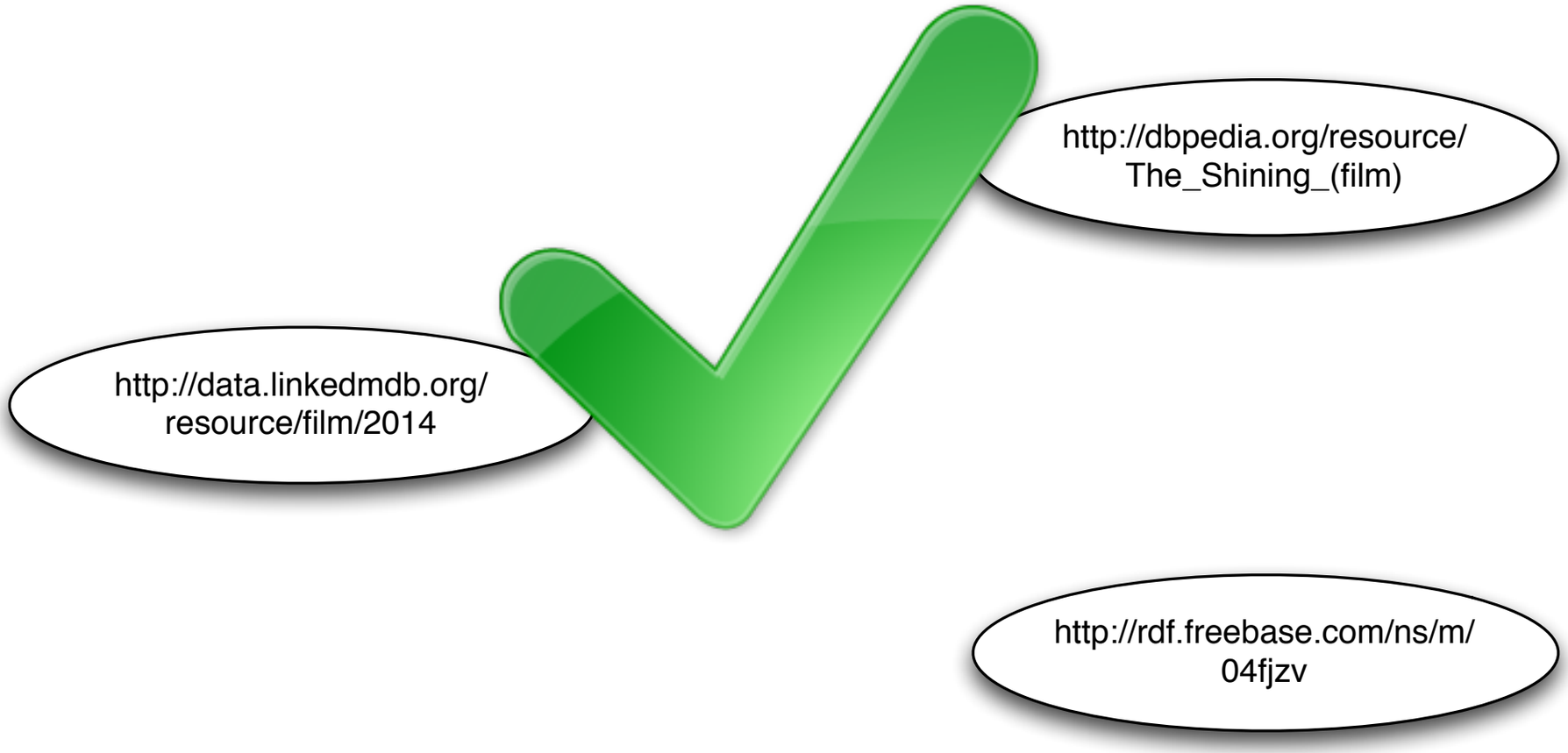
- SKOS

- Questions, Housekeeping, ...

RECAP

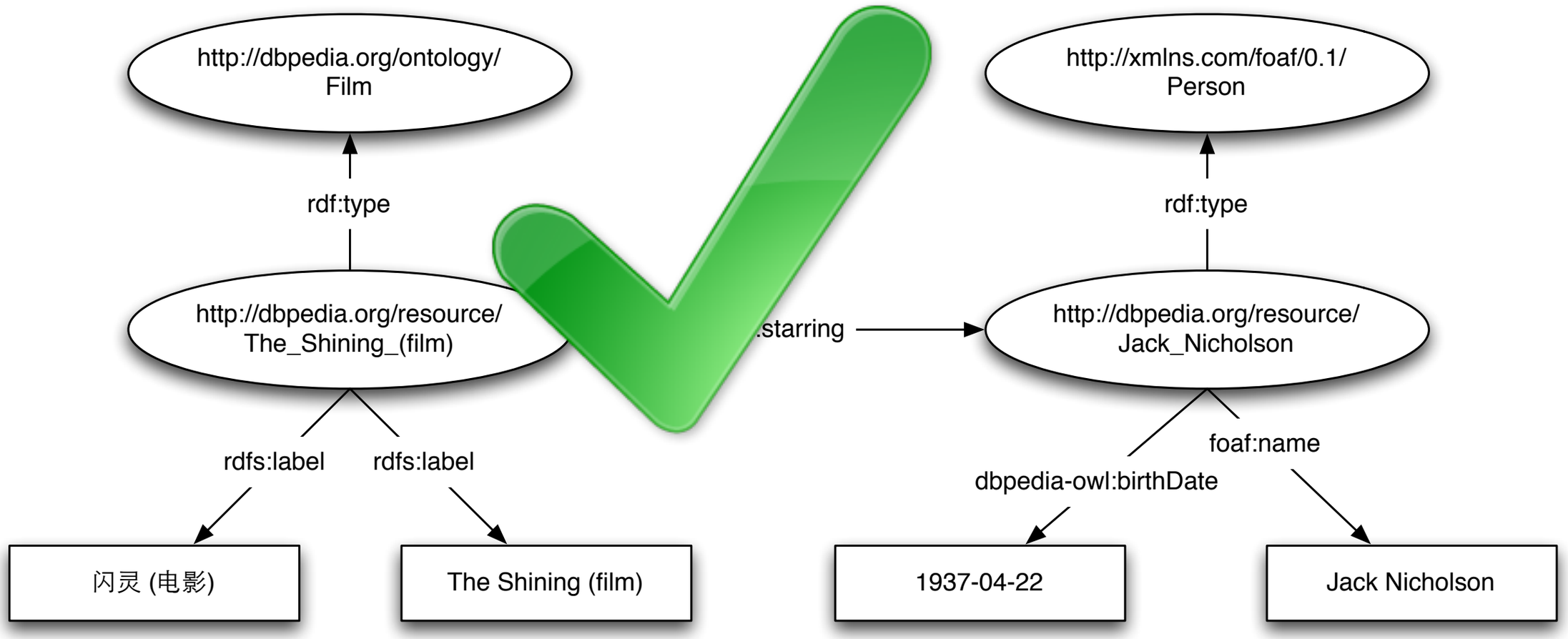
URI

- Name and identify things (resources)
- Dereferencable HTTP URIs



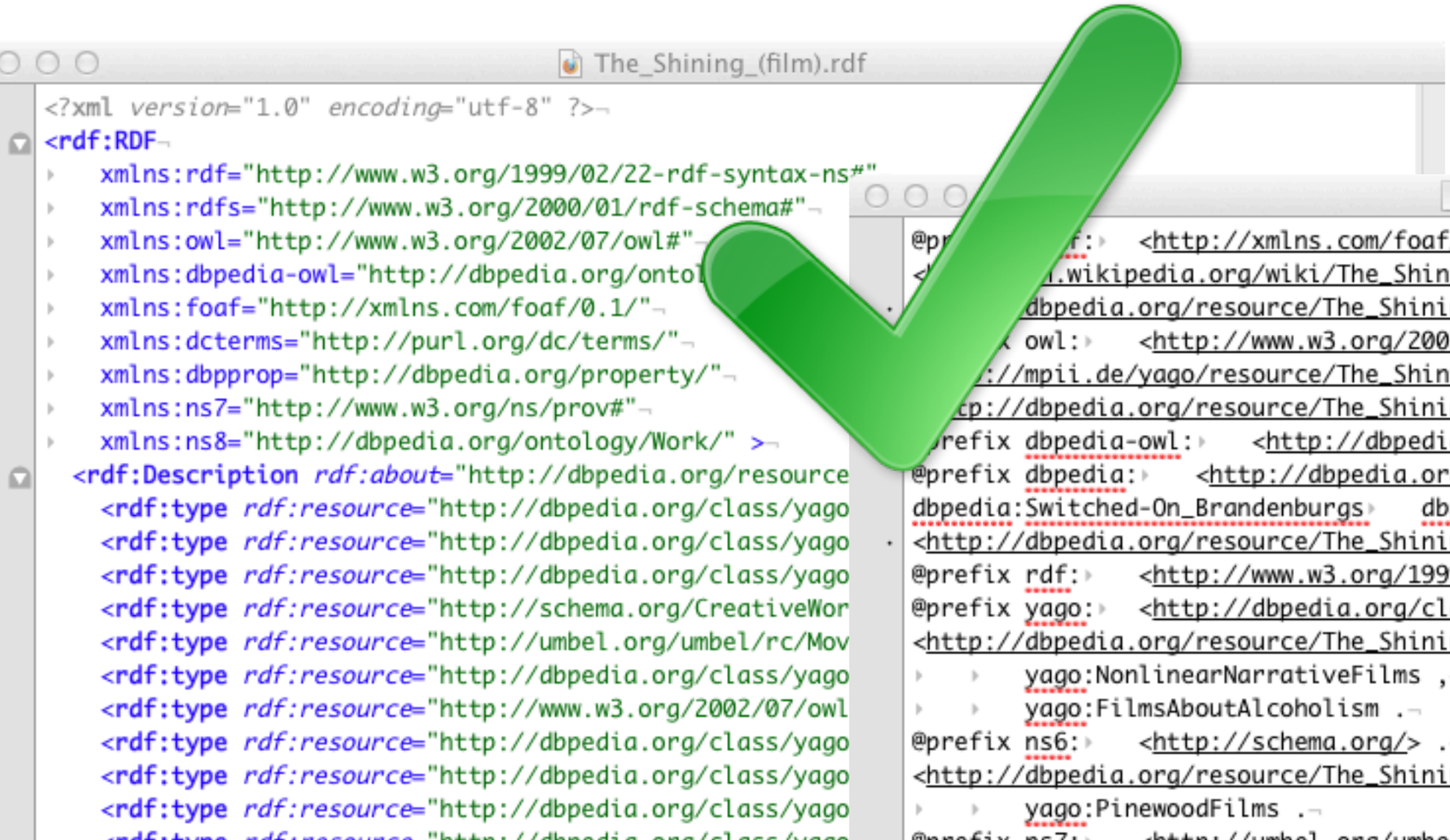
RDF

- A data model for representing data on the Web
- Several statements (triples) form a graph



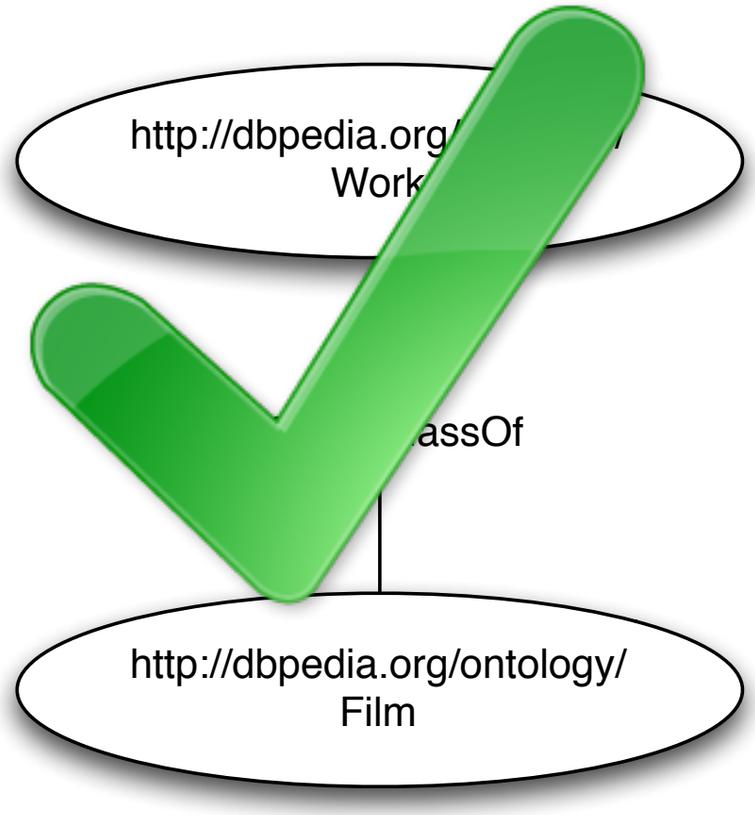
RDF/XML, N3, Turtle, etc.

- Data formats for RDF resource representations
- Used to transfer RDF data between apps



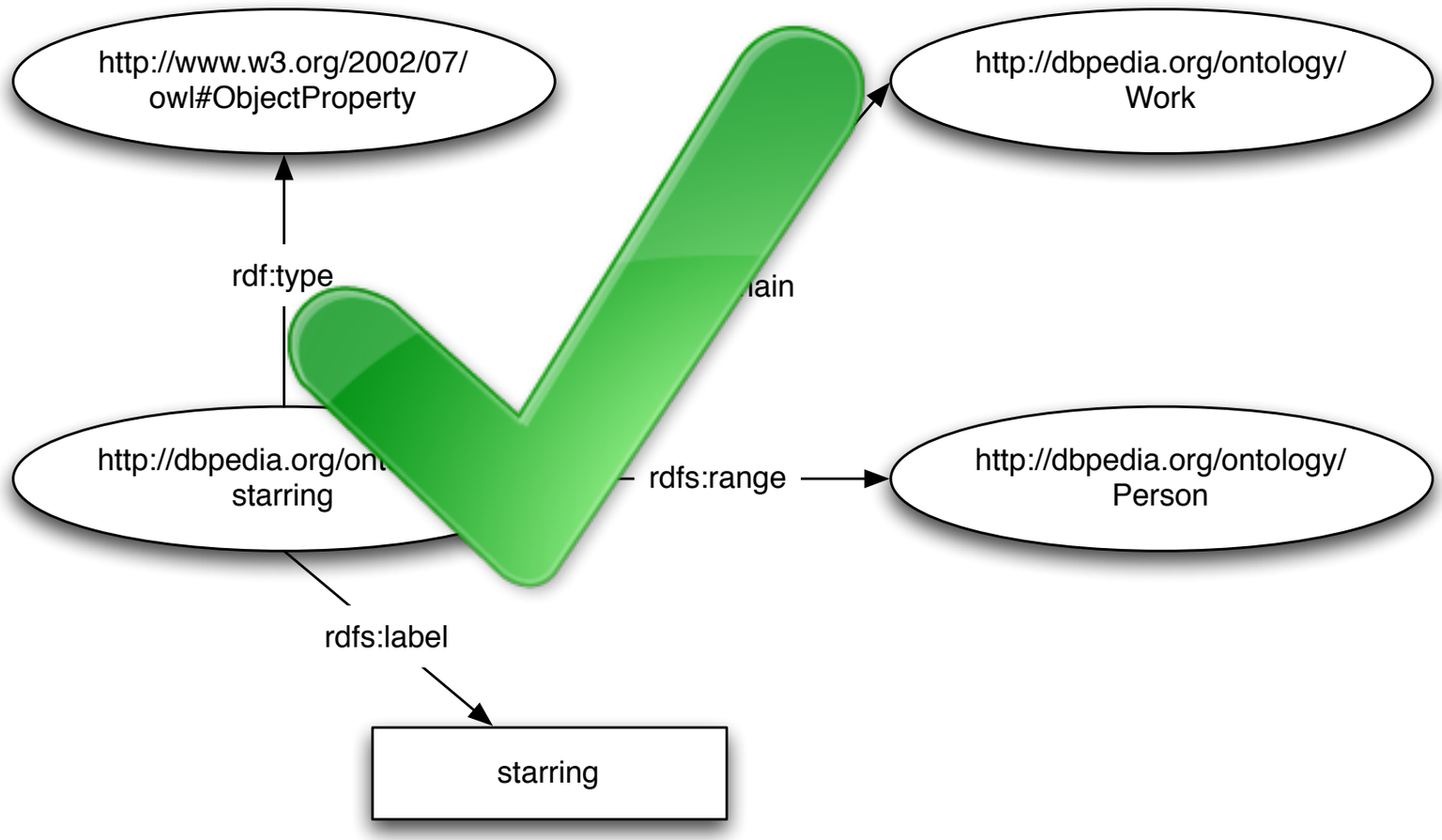
RDFS

- A language for describing the syntax and semantics of vocabularies in a machine-understandable way



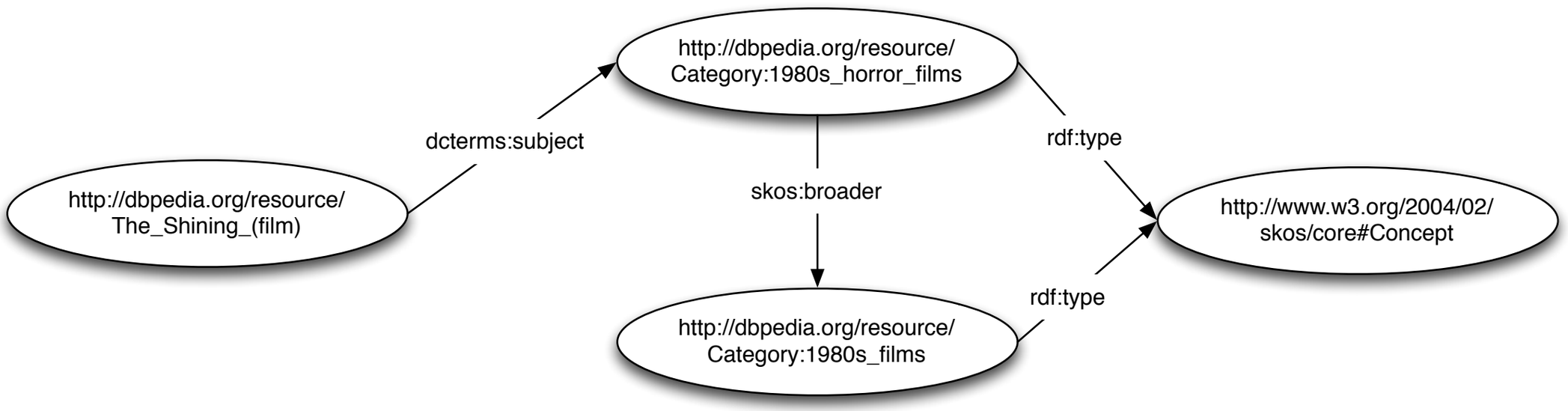
OWL

- A more expressive (formal) language for defining the syntax and semantics of vocabularies
- Solves RDFS shortcomings but introduces quite some complexity



SKOS

- A language for describing controlled vocabularies (taxonomies, thesauri, classification schemes)



SPARQL

- A query language and protocol for accessing RDF data on the Web

```
SELECT DISTINCT ?x
WHERE {
      ?x dcterms:subject
      <http://dbpedia.org/resource/Category:1980s_horror_films> .
}
```

RDF APIs

- Java
  - Jena Semantic Web Framework (http://jena.apache.org/)
  - Sesame RDF API (http://www.openrdf.org)
- PHP
  - ARC (http://arc.semsol.org/)
- Ruby
  - RDF.rb: Linked Data for Ruby (http://rdf.rubyforge.org/)
- Python
  - RDFLib (https://github.com/RDFLib)
- C
  - Redland RDF Libraries (http://librdf.org/)

Linked Data debugging

using cURL:

```
curl -iH "Accept: application/rdf+xml"
http://dbpedia.org/resource/The_Shining_\(film\)
```

```
curl -LH "Accept: application/rdf+xml"
http://dbpedia.org/resource/The_Shining_\(film\)

curl -iH "Accept: text/n3"
http://dbpedia.org/resource/The_Shining_\(film\)
```

Linked Data debugging

using raptor (http://librdf.org/raptor/):

```
rapper -o rdfxml
http://dbpedia.org/resource/The_Shining_\(film\)
```

```
rapper http://dbpedia.org/resource/The_Shining_\(film\)
     > ~/Desktop/the_shining.nt
```

DISCUSSION HW7

INFO/CS 4302: Web Informat
www.infosci.cornell.edu/Courses/info4302/2012fa/homeworks.php
AnnotateIt
CALIXTO ON CHROM

HW7: Basic RDF Construction and Programming (Due: 11/01 11:59pm)

The purpose of this homework is to give you experience with using the Resource Description Framework (RDF) and existing RDF libraries (APIs). You will also extend the RESTful Movie Service from the previous assignment and bring it one step further to a Linked Data service.

You can download and use the provided code skeleton for this homework.

Task 1: RDF APIs

Model the movie data set from the previous assignments as RDF statements. In as many cases as possible use elements (classes and properties) from existing vocabularies. Hint: although most facts can be expressed in these vocabularies, there are a few that can't, in which case you should use a single new namespace of your choosing.

Write a program (e.g., convert.py) that takes the three movie data CSV files as input, converts them into an in-memory RDF graph, and serialize that RDF graph into at least two different RDF formats (e.g., e.g., RDF/XML, Turtle) on completion. Use an existing RDF library (e.g., RDFlib) for handling RDF models in your program.

Make sure you provide instructions on how to run your program README.TXT.

Task 2: Enhance movie service to support RDF

Extend your Movie Service from the previous assignment so that it also supports at least two RDF serialization formats (e.g., RDF/XML, Turtle) for use cases UC3 (Retrieve a specific actor) and UC4 (Retrieve a specific movie). You don't need to implement resource creation / update functions based on RDF.

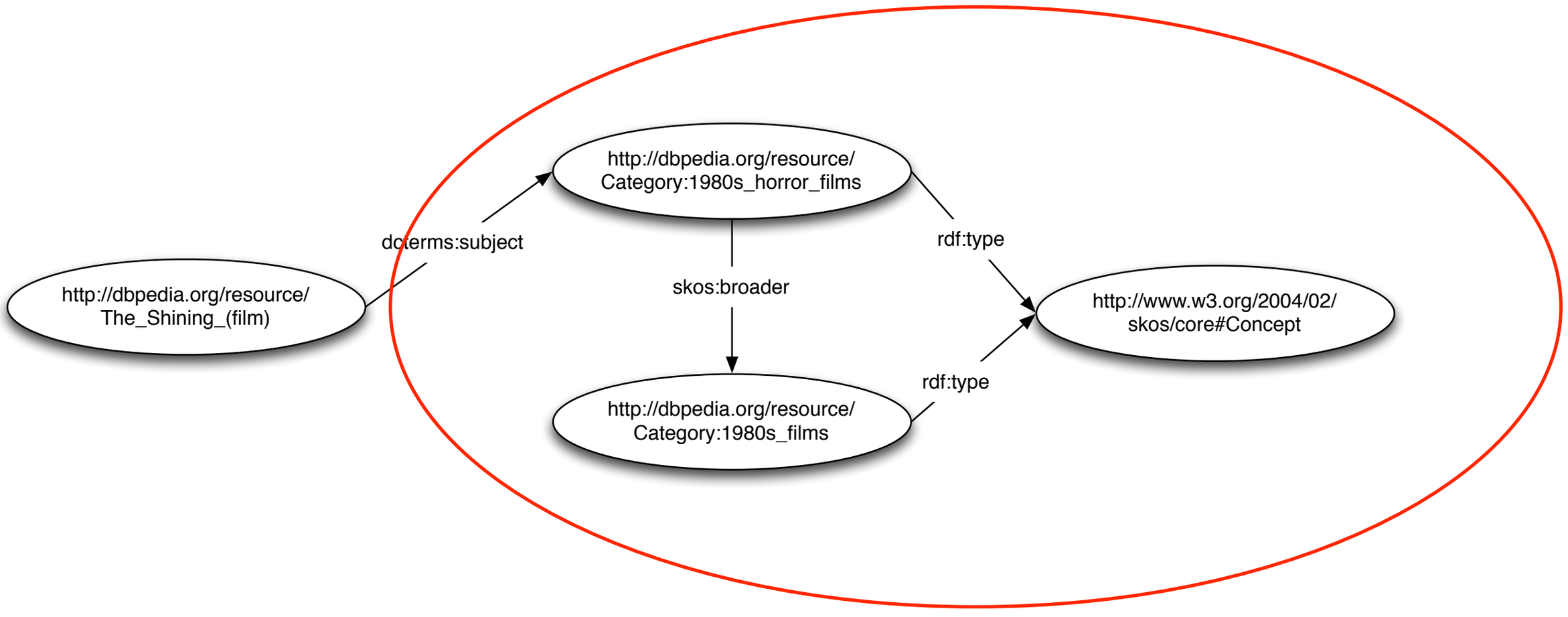
You can either use an RDF API or template mechanisms such as those provided by Tornado.

Test your implementation using cURL and/or raptor and provide example commands in README.TXT.

SKOS

Simple Knowledge Organization System (SKOS)

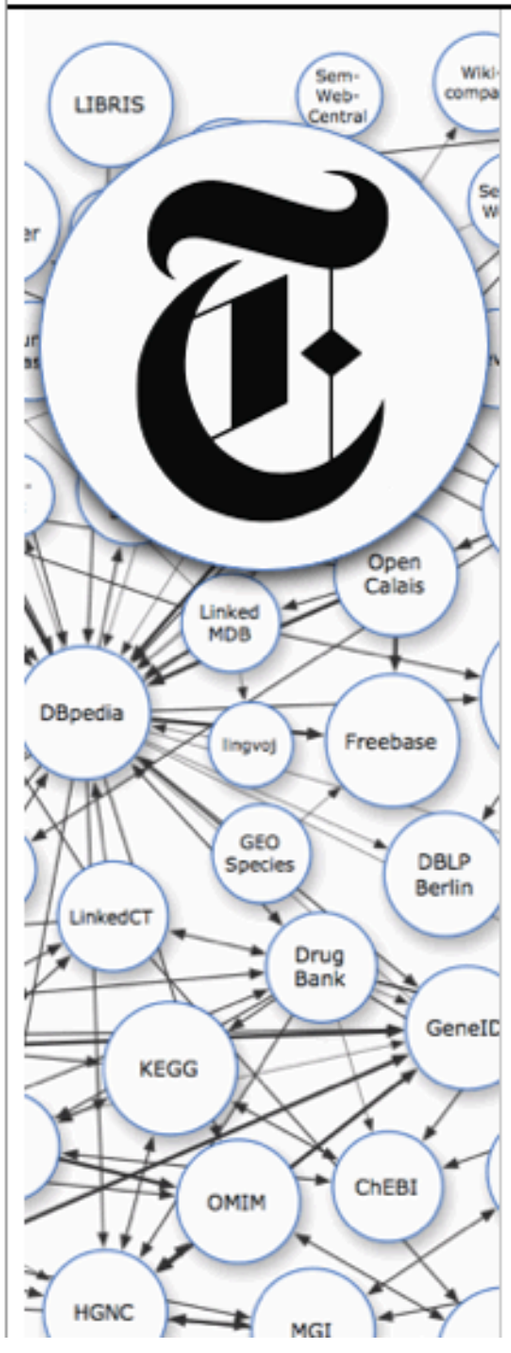
- A language for describing knowledge organization systems (taxonomies, thesauri, classification schemes)



The New York Times

Linked Open Data BETA

Search data.nytimes.com



data.nytimes.com

For the last 150 years, The New York Times has maintained one of the most authoritative news vocabularies ever developed. In 2009, we began to publish this vocabulary as linked open data.

The Data

As of 13 January 2010, The New York Times has published approximately ,10,000 subject headings as linked open data under a CC BY license. We provide both RDF documents and a human-friendly HTML versions. The table below gives a breakdown of the various tag types and mapping strategies on data.nytimes.com.

Type	Manually Mapped Tags	Automatically Mapped Tags	Total
People	4,978	0	4,978
Organizations	1,489	1,592	3,081
Locations	1,910	0	1,910
Descriptors	498	0	498
			10,467

Browse individual data records:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

SKOS Files

Download all of the data records as SKOS Files.

· People

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The AGROVOC thesaurus contains more than 40 000 concepts in up to 22 languages covering topics related to food, nutrition, agriculture, fisheries, forestry, environment and other related domains.

A global community of editors consisting of librarians, terminologists, information managers and software developers, maintain AGROVOC using VocBench, an open-source multilingual, web-based vocabulary editor and workflow management tool that allows simultaneous, distributed editing. AGROVOC is expressed in Simple Knowledge Organization System (SKOS) and published as Linked Data.

- Explore search terms or browse hierarchies
- Download or access via web services
- Suggest new terms not present yet

LATEST NEWS

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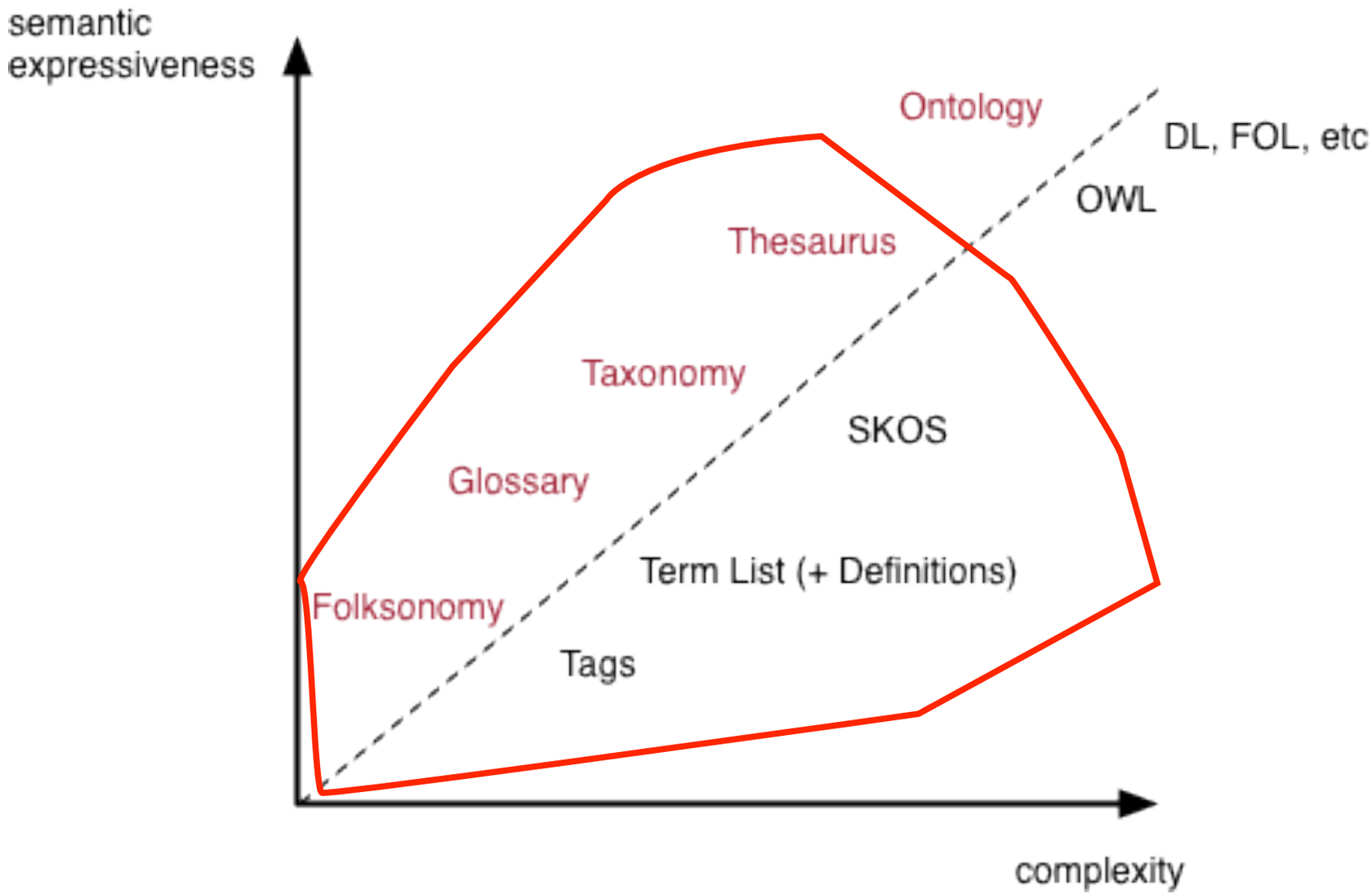
PREV NEXT

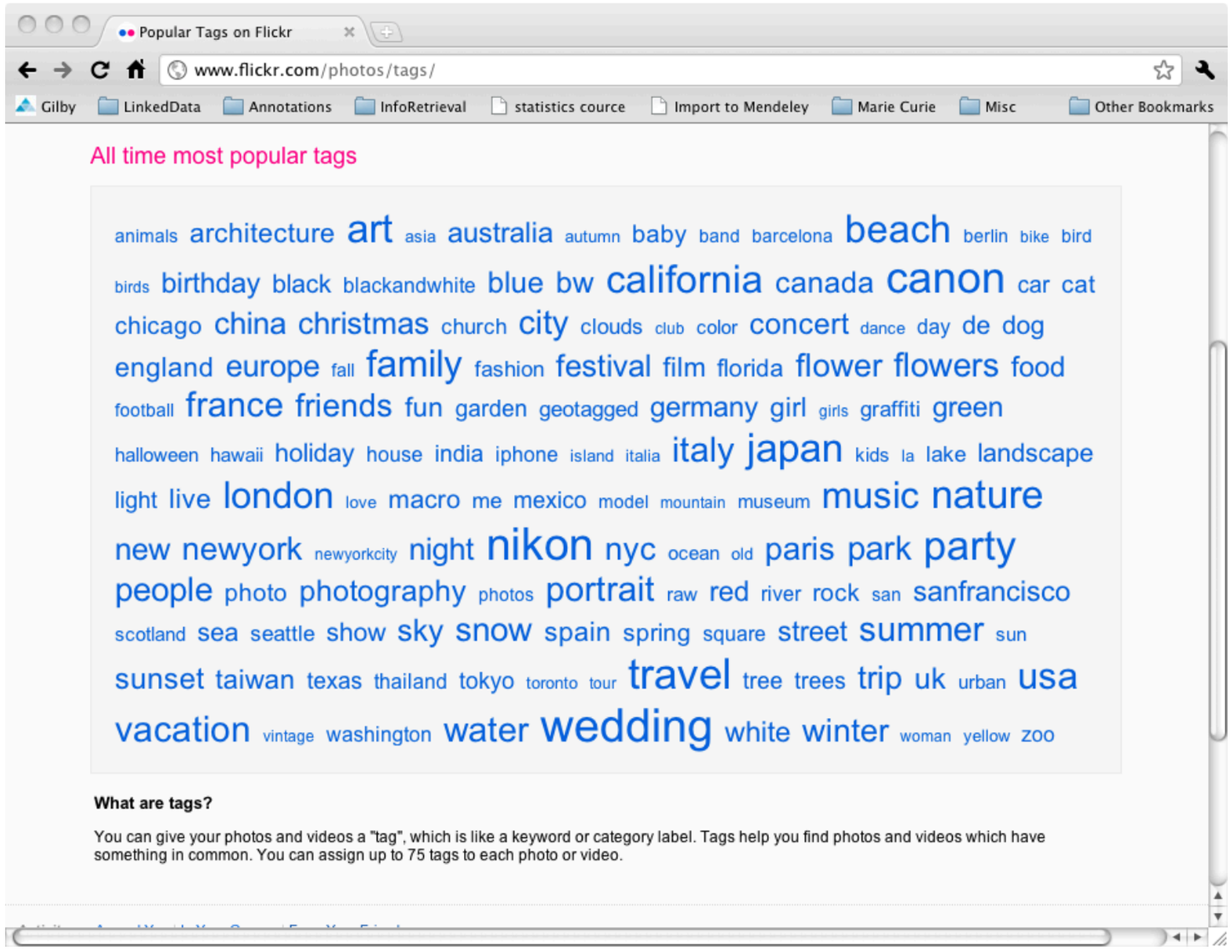
Knowledge Organization Systems (KOS)



Folksonomy

- Not controlled by some central authority
- Usually no explicit definition of meanings
- Used in
  – collaborative tagging systems
  – social media

Folksonomy Examples



twitter

#info4302

Controlled Vocabulary

- A simple list of terms, definitions and naming conventions
- Some process "controls" adding and removing term definitions to ensure consistency
- Terms are often defined in relationship to each other
- Glossaries, Taxonomies, and Thesauri are example types of controlled vocabularies

Taxonomy

- Classification of entities in a hierarchy
- A taxonomy node stands for a real-world entity type

CAROLI LINNÆI

REGNUM ANIMALE.

I. QUADRUPEDIA.

Corpus hirsutum. *Pedes* quatuor. *Femina* vivipara, lactifera.

ANTHROPOMORPHA. *Dentes primores 4, in utroque: interstitia vel nulla.*

- Homo. — Nudus ac ipsum. — Europæus albus. Americanus rubicundus. Asiaticus fuscus. Africanus niger.
- Simia. — Antropomorpha. Pongo. Lar. Papio. Satyrus. Cynocephalus. Cynomolgus. — Simia caude carens.
- Bradypus. — Digiti 3, vel 2. . . 3. — Ai. Quæsus. Tardigradus.

FERÆ. *Dentes primores 6, utrinque: interstitia longiora: canes acuti. Pedes unguiculati, unfiparti.*

- Ursus. — Digiti 5. . . . 5. Scandens. — Ursus. Canis mag. Walckenii. Angl.
- Leo. — Digiti 5. . . . 5. Scandens. — Leo.
- Tigris. — Digiti 5. . . . 5. Scandens. — Tigris. Pantheræ.
- Felis. — Digiti 5. . . . 5. Scandens. — Felis. Canis. Lynx.
- Mustela. — Digiti 5. . . . 5. Scandens. — Martes. Zibellina. Viverra. Mephitis. Putorius.
- Didelphis. — Digiti 5. . . . 5. — Filander. Pygmæus.
- Lutra. — Digiti 5. . . . 5. Palmipes. — Lutra.
- Odobenus. — Digiti 5. . . . 5. Palmipes. — Rosmarus. Morsus.
- Phoca. — Digiti 5. . . . 5. Palmipes. — Canis marinus.
- Hyæna. — Digiti 4. . . . 4. — Hyæna Fera. Picum Lambii auctor vidit qui delineavit Antuerpiæ.
- Canis. — Digiti 5. . . . 5. — Canis. Lupus. Aquilarchi. Vulpes.
- Meles. — Digiti 5. . . . 5. — Taxus. Labella.
- Talpa. — Digiti 5. . . . 5. anteriores maximi. — Talpa.
- Erinaceus. — Digiti 5. . . . 5. — Echinus terrestris. Hemicillus.
- Vespertilio. — Digiti 5. . . . 5. — Vespertilio. Felis volans Zal. Canis volans Zal. Glis volans Ind.

GLIRES. *Dentes primores 4, utrinque. Pedes unguiculati.*

- Hystrix. — Aures humanæ. Corpus fpinofum. — Hystrix.
- Sciurus. — Digiti 4. . . . 5. Cauda longiffima laxiger. — Sciurus. . . . volans.
- Castor. — Digiti 5. . . . 5. palmipes pollice. — Fiber.
- Mus. — Digiti 4. . . . 5. Cauda teres, fquamofa, hirfuta. — Rattus. Mus domeſticus. . . hortenſis. . . . mycrourus.
- Lepus. — Digiti 5. . . . 4. Cauda brevifſima, villofa. — Lamarus. Marmota. Lepus Cuniculus.
- Sorex. — Digiti 5. . . . 5. Dentes canini nullæ. — Sorex.

JUMENTA. *Dentes primores 6, inferiores cuneati, canini cauti, vacui.*

- Equus. — Ungulæ 1. ingulatæ. Pedes integri. — Equus. Asinus. Quagga. Zebra.
- Hippopotamus. — Ungulæ 2. ingulatæ (Auct.) Pedes quadrifidi. — Equus marinus.
- Elephas. — Ungulæ 1. pedatæ. Pedes 3. calla infruſti. — Elephas. ? Rhinoceros.
- Sus. — Ungulæ 10. abdominales. Pedes bungulati: rare ſimplices. — Sus. Aper. Porcus. Babyrouſſa. Tajacu.

PECORA. *Dentes primores inferiores truncati: superiori nulli. Pedes ungulati.*

- Camelus. — Cornua nulla. — Dromedarius. Bactrianus. Glama. Pacos.
- Cervus. — Cornua teretia; primum pilofa, folida, ab apice creticentia, plurimis ramofa: frondem rara. — Camelopardalis. Capreo. Alce. Cervus. Tarandus. Rhenon. Rangifer. Alces.
- Capra. — Cornua furſum verſa, cauſta, fiulata. — Hircus. Ibex. Rupicapra. Strepſiceros. Gazella. Tragelaphus.
- Ovis. — Cornua retrorſum flexa tenuia, rugoſa. — Ovis vulgaris. . . Arabica. . . Africana. . . Angolenſis.
- Bos. — Cornua teretiuſcula verſa, lævigata, lævia. — Bos. Urus. Bifon. Bubalus.

Ordines. — Genera. — Characteres Generum. — Species.

ACCIPITRES. *Rostrum uncinatum.*

- Piſcacus. — Digiti pedis antici 2. poſtici 2. — Pitiacus.
- Strix. — Digiti pedis antici 3. poſterior 1. quorum extimus retrorſum flexilis. — Bubo. Otus. Noctua. Ulula.
- Falco. — Digiti pedis antici 3. poſterior 1. — Aquila. Vultur. Falco. Buteo. Pygargus. Milvus. Cyanopus. Tyrannus. Lanarius. Peregrinus. Nifus. Tinnunculus.

PICÆ. *Rostrum fuprà compreſſum, convexum.*

- Paradiſea. — Penna 2. longiſſimæ, ſingulares, non vix, aut vexillo inſtar. — Manucodiata. Avis Paradiſea.
- Coracias. — Pes ſyndactylus. Roſtrum anterius gradatim breviores. — Pica.
- Corvus. — Pes ſyndact. Roſtrum rectum. — Corvus. Cornix. Monedula. Lupus. Glandaria. Caryocatactes.
- Cuculus. — Digiti pedis antici 2. poſtici 2. Roſtrum leve. — Cuculus. Torquilla f. Jynx.
- Picus. — Digiti pedis antici 2. Roſtrum rugoſum. — Picus niger. . . . viridis. . . . varius.
- Certhia. — Pes ſyndact. Roſtr. gracile incurvum. — Certhia.
- Sitta. — Pes ſyndact. Roſtr. triangulare. — Picus cinereus
- Upupa. — Pes ſyndact. Caput plumis erectum. — Upupa.
- Iſpida. — Pes ſyndact. cujus digitus extimus medio adnectitur vitæ reticula. — Alcedo. Merops.

MACRORHYNCHI. *Rostrum longum, acut.*

- Grus. — Caput calvum. — Grus.
- Ciconia. — Corpus plani, ſubnatandi. — Ciconia.
- Ardea. — Digiti medius infimo ſerratus. — Ardea.

ANSERES. *Os lamato-dentatum.*

- Platea. — Roſtr. depreſſo-planum, apice ſubcur. — Platea.
- Pelecanus. — Roſtr. depreſſum, apice unguiculato, inferne burſa infirutum. — Onocrotalus.
- Cygnus. — Roſtr. cranio-convexum. — Olor. Ardea. Ardea. Anſ. Bernicla.
- Anas. — Roſtr. cranio-depreſſum. — Anas ſera. Boſchas. Penelope. Clangula. Querquedula.
- Mergus. — Roſtr. cylindraceum, apice adunco. — Mergus. Merganſer.
- Graculus. — Roſtr. conicum, apice adunco. — Carbo aquat. Graculus aquat.
- Colymbus. — Roſtr. fubulatum. Pedes infra aquilibr. — Colymbus. C. minor. Podiceps. Arctica.
- Larus. — Roſtr. ſubulatum. Pedes in aquilibr. — Cataractes. Larus. Pelecus.

SCOLOPACES. *Os teres cylindraceo-attenuatum.*

- Hæmatopus. — Pes 3digit. Roſtri apex compreſſus. — Pica marina.
- Charadrius. — Pes 3digit. Roſtri apex teres. — Pluvialis. Hiaticula.
- Vanellus. — Pes 4digit. Roſtrum digitis brevius. Caput punctis criſtatum. — Capella.
- Tringa. — Pes 4digit. Roſtrum digitis brevius. Caput ſimplex. — Tringa. Gambetta. Fugnax. Gallinula.
- Numenius. — Pes 4digit. Roſtrum digitis longius. — Gallinago. Limoſa. Arquata. Recurviroſtra.
- Fulica. — Pes 4digit. Digiti membranis auct. Caput cærulo-criſtatum. — Gallinula aquatica.

GALLINÆ. *Rostrum conico-incurvum.*

- Struthio. — Pes 2digit. ubique pedtus. — Struthio camelus.
- Caſuarius. — Pes 3digit. ubique pedtus. Caput galeis & pilorum cinctum. — Emeu.
- Otis. — Pes 3digit. ubique pedtus. Caput ſimplex. — Tarda.
- Pavo. — Pes 4digit. Caput cornlis penne. em. — Pavo.
- Meleagris. — Pes 4digit. Pene papillis. Gula membrana? unici longitudinis inſt. Frutta. — Gallopavo.
- Gallina. — Pes 4digit. Pene membrana ſtruata. Gula nemin. duplici longitud. inſt. — Gallus.
- Tetrao. — Pes 4digit. Superiùs papillofa nuda. — Phaſianus. Urogallus. Bonaſia. Perdix. Tetrao. Lagopus. Coturnix.

PASSERES. *Rostrum conico-attenuatum.*

- Columba. — Roſtr. rectum, ad baſin furfuraceum. Nares oblongæ, membranula ſuperne tectæ. — Columba. Turtur. Palumbus. Oenas.
- Turdus. — Roſtr. parum convexum. Plumæ nidi baſin tegunt. — Turdus. Merula.
- Sturnus. — Roſtr. rectum fubcrens. Lingua biſida carnea. — Sturnus.
- Alauda. — Digiti digiti poſtici digitis ipſis longiores. — Alauda.
- Motacilla. — Roſtr. gracile. Penne nigricant. Lingua apice biſida laciniata. — Motacilla. Oenanthe. Merula aquatica.
- Luſcinia. — Roſtr. gracile rectum. Lingua apice biſida laciniata. — Luſcinia. Ficedula. Erithacus. Troglodytes. Carolina. Rutil.
- Parus. — Roſtr. gracile. Lingua apice truncata, 4 ſeis laciniata. — Parus. P. cauduto. . . . cilleum.
- Hirundo. — Roſtr. gracile, ad baſin depreſſum, mucronum: rictus amplifſimus. — Hirundo. Caprimulgus.
- Loxia. — Roſtr. craſſum, rugoſum, breve, curvum, undique convexum. — Coccothraustes. Loxia. Pyrrhula.
- Ampelis. — Roſtr. craſſum, rectum. Lingua apice acutiuſcula membranaceâ. — Garrulus Bohem.
- Fringilla. — Roſtr. craſſum. Mandibulæ utrinque dentem ſinu quodam ad baſin recipit. — Fringilla. Cardelis. Cardinalis. Spinus. Linaria. Paſſer.

III. AMPHIBIA.

Corpus nudum, vel ſquamoſum. *Dentes* molares nulli: reliqui ſemper. *Pinnæ* nullæ.

SERPENTES.

- Teſtudo. — Corpus quadrupedum, crudorum, tecta munitum. — Teſtudo tabulata. . . . tergina. . . . marina.
- Rana. — Corpus quadrupedum, crudi denſitatem, ſquamis carens. — Bufo. Rana arborea. . . . aquatica. . . . Cornuta.
- Lacerta. — Corpus quadrupedum, crudorum, ſquamatum. — Crocodilus. Alligator. Caudiverbera. Draco volans. Sciurus. Iguana. Stellio. Chamæleo. Lacerta. Stellionis ang. Gecko. Iguana. Cæcilia. Aſcalabotes. Cordylus. Cobra de Cabello. Anguis Æthiopica. Caſcabella. Natrix. Hydrus.
- Anguis. — Corpus apodum, teres, ſquamatum. — Amphisbæna. Cæcilia. Natrix. Hydrus.

Amphibiorum Claſſem ulterius continuare noluit benignitas Creatoris; Ea enim ſi tot Generibus, quot reliquæ Animalium Claſſes comprehenduntur, gauderet; vel ſi vera eſſent quæ de Draconibus, Baſiliſcis, ac ejuſmodi monſtris ſi vulgatiſſima fabulantur, orbi luxuriem genus terram inhabitant vix poſſet.

PARADOXA.

Hydra corpore anguino, pedibus duobus, collis ſeptem, & totidem capitibus, alarum expers, adſervatur Hamburgi, ſimilitudinem referens Hydræ Apocalypticæ à S. Johanne Cap. xii. & xiii. deſcriptæ. Eaque tanquam veri ſimilis ſpecies plurimis probatur, ſed falſo. Natura ſibi ſemper ſimilis plures capita in uno corpore nunquam produxit naturaliter. Fraudem & artificium, cum lipſi viderunt, dentes Ferino-muſtelini, ab Amphibiorum dentibus diverſi, ſe cillime detexerunt.

Rana-Piscis i. Ranæ in Piscem Metamorphosis valde paradoxa eſt, quam Natura monſtrorum Generis unica in ulnam diverſis Claſſis non admittit. Ranæ, ut Amphibii omnis, pulmonibus gaudent & oſſibus ſpinoſis. Piſces (piſces, loco pulmonum, branchias inſtruxerunt. Ergo leg Naturæ contraria foret hæc mutatio. Si enim piſcis hic in ſtructus eſt branchiis, erit diverſus à Rana & Amphibia. S verò pulmones, erit Lacerta: non toto cælo à Chondropterygiis & Plagiuris diſtert.

Monocerus *Ktesiæ*, corpore equino, pedibus ferinis cornu recto, longo, ſpirallter intorto, Pilorum ſignem tum eſt. Monocerus *Arrodi* ejuſmodi cornu geris, cæteri verò partibus multum differt.

Pelecanus roſtro vulnus infligena femori ſuo, ut ema nante ſanguine ſitim pullorum levet, fabuloſi ab Iſidem tradit. Anſam fabulæ dedit ſacrus ſub gula perdulus.

Satyrus caudatus, hirſutus, barbatus, humanam re ſorma corpus, gefticulationibus valde deditus, ſalaciſſimus Simiæ ſpecies eſt, ſi unquam aliquis vifus fuit. *Homines* quoque *Caudati*, de quibus recentiores peregrinatores multa narrant, ejuſdem generis ſunt.

Borometz i. Agnus Scythicus plantis accenſetur, à agno adſimilatur; cui caulis ulcerius planta è terra emergens umbilicum inter; ideoque ſanguine præditus à feris devoratur temere dicitur. Eſt autem arrideadi ex radicibus Filicinis Americanis compoſitus. Naturaliter autem eſt *Equus Ovis* allegoricè deſcriptus, qui omnia data habet mirabilia.

Phœnix, Avis ſpecies, cujus unicum in mundo individuum, & quæ decrepita ex ſerali buſto, quod ſibi ex ramentibus ſtruxerat, renovaſcere fabuloſe fertur, ſelicem fabulatura prioris vitæ periodum. Eſt verò Palma Dactylifera. Vid. *Kæmpf.*

Bernicla i. Anser Scoticus & Concha Anatifera è lignis putridis in mare objectis naſci à Veteribus creditur Sed ſactum impoſuit *Lyæus* inter reſia pannoſormia, & modo adhærendi, quaſi verus ille anſer *Bernicla* inde oriretur.

Draco corpore anguino, duobus pedibus, duobus alis Vespertilionis inſtar, eſt *Lacerta alata*, vel *Rana* per artem monſtroſe fida, & ſictrea.

Automa Mortis Horologii minimi ſonitum edens in pectoribus, eſt *Pediculus pulſatorius* dictus, qui ligna perforat, eaque inhabitat.

IV. PISCES.

Corpus apodum, pinnis veris inſtructum, nudum, vel ſquamoſum.

PLAGIURI. *Cauda horizontalis.*

- Thrichechus. — Dentes in utroque maxilla. Dorſum impenne. — Manatus C. Vacca mar.
- Cetodon. — Dentes in inferiore maxilla. Dorſum impenne. — Cet. Fiſtula in roſtro Act. Cetac Clas.
- Monodon. — Dens in ſuperiore max. 1. Dorſum impenne. — Monoceros. Unicornu.
- Balæna. — Dentes in ſup. max. cornei. Dorſum ſæpius impenne. — B. Groenland. B. Fiſtrich. B. Mauſſ. ind. latere. Act.
- Delphinus. — Dentes in utraque maxilla. Dorſum pinnatum. — Orcha. Delphinus. Phocæna.

CHONDROPTERYGII. *Pinnæ cartilagineæ.*

- Raja. — Foramina branch. utrinq. 5. Corpus depreſſum. — Raja clav. aſp. lav. &c. Squatino-Raja Altavela. Pelinaca mac. Aquila. Torpedo. Bon Fer.
- Squalus. — Foram. branch. utrinq. 5. Corpus oblongum. — Lamia. Galeus. Carcias. Vulpes mar. Zygæna. Squatina. Centrina. Pristis.
- Acipenſer. — Foram. branch. utrinq. 1. Os edentul. tubuliferum. — Sturio. Huſo. Ahlefpeuffe.
- Petromyzon. — Foram. branch. utrinq. 7. Corpus lubricum. — Entomophthirum. Lampetra. Muſtela.

BRANCHIOSTEGI. *Pinnæ offis. carentes. Branchiæ offis. carentes.*

- Lophius. — Corpus magnitudine corporis Appendices horizontaliter lotæ ſetis pilis armatæ. — Rana pifcatrix. Gualeviqa.
- Cyclopterus. — Pinna ventralis in unicum circulorem concreta. — Lumpus. Lepus mar.
- Oſtracion. — Pinna ventralis nulla. Cutis dura, ſæpe aculeata — Orbis dir. ſp. Pil. triangul. Artaga. Hydrus. Oſtracion. Lagocephalus.
- Baliſtes. — Dentes conſigni maxillæ. Aculei aliquot retrorſi in dorſo. — Giuppetus. Capriſcus. Hiſtrix. Caper.

ACANTHOPTERYGII. *Pinnæ offis, quarum ſpinoſus anterior.*

- Gaſterofteus. — Mandib. branch. officula 3. Finnæ laminis offeis infr. — Acuſtreus. Spinachia. Pungitius.
- Zeus. — Corpus compreſſum. Squamæ ſubaſperæ. — Aper. Faber. Gallus mar.
- Corvus. — Membranæ branch. offic. 6. Corpus aculeatum, corpore latius. — Centrifchidus. Scorpio mar. Cottus. Gobio ſ. capit.
- Trigla. — Appendices ad pinn. perh. articulatæ 2 vel 3. — Lyra. Gurnardus. Cuculus. Lucerna. Hirundo. Milvus. Mullus barb. & imberb.
- Trachinus. — Operculi branch. aculeum. Genii vittati in vertice. — Draco. Araneus mar. Uranoſcopus.
- Perca. — Mandi. branch. officul. 7. Pinna dorſalis. 1 vel 2. — Perca. Lucioperca. Cernua. Schraetzer.
- Sparus. — Operculi branch. ſquamoſi. Labia dentes tegunt. Dentes molares conicæ. — Salpa. Melanurus. Sparus. Sargus. Chromis. Mormyrus. Mæna. Smaris. Bogue. Dentex. Erythrinus. Pagrus. Aurata. Cantharus.
- Labrus. — Labia craſſa dentes teg. Color ſpectabilis. — Iulis. Bacherus. Turdus diverſic. ſpecies.
- Mugil. — Mandi. branch. offic. 6. Corpus teretiuſculum. — Mugil. Cephalus.
- Scomber. — Mandi. branch. officul. 7. Pinnæ dorſ. 2. vel plures. — Glaucus. Atrin. Scombrus. Thynnus. Trachurus. Saurus.
- Xiphias. — Roſtrum ſpice enſiformi. Pinna ventralis nulla. — Gladius.
- Gobius. — Pinna ventr. in 1 ſimpl. conor. Aperture ſpinæ. — Gob. niger. Jozo. Paganellus. Aphya.

MALACOPTERYGII. *Pinnæ offeæ, quæ omnes molles.*

- Gymnotus. — Mandib. branch. officul. 5. Pinna dorſalis nulla. — Carapo.
- Muræna. — Mandib. branch. offic. 10. Tubuli in apice rubri. — Anguilla. Conger. Pisa. Serpens mar.
- Blennus. — Pin. ani vertr. conſtant oſſ. 2. Caput utrinq. denſum. — Ahlotn non cirh. & galer. Gattorug. Gunnellus.
- Gadus. — Mandib. branch. offic. 7. 2 vel 3. Pinna dorſi. — Afellus diverſic. ſpecier. Merlangus. Aeglefinus adus. Molvis. Egrefinus.
- Pleuronectes. — Mandib. branch. off. 6. Oculi ambo in eodem latere. — Rhombus diver. ſpecier. Paſſer. Limanda. Hippoglofſus. Buglofſ. Solea.
- Ammodytes. — Mandib. branch. offic. 7. Pinna ventr. nulla. — Ammodytes. Tobianus.
- Coryphæna. — Mandib. branch. offic. 6. Pinna dorſi à capite ad caudam. — Hippurus. Pompilus. Novacula. Pallida.
- Echeneis. — Scia tranſverſa, oſſea, in ſuperna capitis parte. — Remora.
- Efox. — Mandib. branch. offic. 14. — Lucius. Belone. Acus maxima Ipanenſis.
- Salmo. — Mandib. branch. offic. 10-12. Corpus maculoſum. — Salmo. Trutta. Umbla. Carpio lacuſtr.
- Oſmerus. — Mandib. branch. offic. 7—8. Dentes in max. lingu. palat. — Eperlanus. Aſpradenas. Sinorca.
- Coregonus. — Mandib. branch. offic. 8—10. Appendix pinaloformis. — Albola. Cenereus. Oxyrhynchus.
- Clupea. — Mandib. branch. offic. 8. Pinnæ ventr. ſenarias. — Harengus. Sprattus. Encrafichulus. Alofa.
- Cyprinus. — Mandib. branch. offic. 7. Dentes ad orificium ventric. nil tendunt. — Erythrophthal. Mugil. Fgx. Brama. Rutilus. Cypro. Nafus. A. M. Carafſius. Cypr. rubilio. Tinca. Barbus. Rutilus. Alburnus. Leuciſcus. Phoxinus. Gobio fl.
- Cubiceps. — Caput compreſſum. Pinna dorſi & ventrales eidem à rubro diſtantes.
- Syngnathus. — Operculi branch. ex lamina 1. Maxilla è lacertis conſta. — Acus lumbr. Acus Aeglea. Hippocampus.

V. INSECTA.

Corpus cruſta oſſea cutis loco tectum. *Caput* antennis inſtructum.

COLEOPTERA. *Alæ elytris duabus tectæ.*

- Blatta. — §. Facies ſuperna faciem ſuperam ſubtus contegens. Alæ coriac. Abdomina truncata. — Scarab. tardipes. Rana ſtercul.
- Dytiſcus. — Pedes poſtici remorum formæ & uſu. Ant. ſetaceæ. Corpus apice biforcum. — Scarab. aquaticus. Hydrocantharus.
- Meloë. — Elytra mollia, flexilia, corpora brevicora. Ant. moniliformes. Os antricula oblonga fundens. — Scarab. majalis. Scarab. unifuſcus.
- Forficula. — Elytra brevillima, rigida. Cauda bifurca. — Staphylinus. Auricularia.
- Notopeda. — Pedum in dorſo oſſilia. Ant. capillaceæ. — Scarab. ſtellatus.
- Mordella. — Cauda aculeo rigido ſimplici armata. Ant. ſtracem, horrent. — Nogaster ab Aculeato.
- Curculio. — Roſtrum productum, teres, ſimplex. Ant. cleviter in medio ſtexi poſitæ. — Curculio.
- Bacteros. — Cornu 1. ſimplex, rigidum, ſurum. Ant. capitatæ, ſtexuoſæ. — Rhinoceros. Scarab. monoceros.
- Lucanus. — Cornua 2. remoti, rigidi, mobilia. Ant. capitatæ, ſtexuoſæ. — Cervus volans.
- Scarabæus. — §. Antennæ tenuiter. Ant. clavatæ ſtexuoſæ. Cornua nulla. — Scarab. pilularius. Melolontha. Dermeſtes.
- Dermeſtes. — Ant. clavatæ horizontaliter patentes. Clypeus planiuſculus, emarginatus. — Cantharus ſaltatorius.
- Caſſida. — Ant. clavato-fubulatæ. Clypeus planus, antice rotundatus. — Scarab. clypeatus.
- Chryſomela. — Ant. ſimplices, clypeo longiores. Corpus ſubcoriandrum. — Cantharellus.
- Coccinella. — Ant. ſimplices, breviſſimæ. Corpus hemiſphæricum. — Cochinella vulg.
- Gyrinus. — Ant. ſimplices. Corpus breve. Pedes poſtici ſubtus. — Pulex aquaticus. Pulex pluvialis.
- Necydalis. — Ant. clavato-prodactæ. Clypeus angulus, rotundatus. — Scarabæo-formis.
- Attalabus. — Ant. ſimplices, conſtratæ articulis cylindraceis, præter ultim. globoſum. — Scarab. pyrenæa.
- Cantharis. — §. Antennæ Setaceæ. Clypeus planus, margine undique promin. Elytra flexilia. — Cantharis ofic.
- Carabus. — Clypeus free planus, marg. prominens. Elytra fragilia. — Cantharus ſuriſtus. Cantharellus auratus.
- Cicindela. — Clypeus cylindraceus vel teres. Forceps ſitis prominens. — Cantharus Maxicanus.
- Leptura. — Clypeus fubrotundus. Pedes longi. Corpus teretiuſculum. — Scarab. tuscus.
- Cerambyx. — Clypeus ad latera utrinque promicat. Ant. corpus longitudine æquant, vel ſuperant. — Capricornus.
- Buprestis. — Clypeus ſuperne a pundtis elevatis notatus. — Scarab. ſylvaticus.

HEMIPTERA. *Alæ elytris deficcatæ, Quibusdam nullæ inferiores concaſtæ.*

ANGIOPTERA. *Alæ membranaceæ, elytris deſtitutæ.*

- Gryllus. — Pedes 6. Alæ 4. ſuperiores quiſtinæ. — Gryllus domeſticus. Gryllo-talpa. Locuſta. Mantis.
- Lampyris. — Pedes 6. Clypeus planus. Alæ 4. — Formica. Cimex.
- Formica. — Pedes 6. Alæ 4. Caudæ acidum conditi. — Formica.
- Cimex. — Pedes 6. Alæ 4. cruciformes. Rostrum ſtexuoſum, rectum. — Cimex lubulatus. Orbiculatus. Tipula aquatica. Bruchus.
- Notonecta. — Pedes 6. quorum poſtici remorum figura & uſu. Alæ 4 cruciformes. — Notonecta aquatica.
- Nepa. — Pedes 6. Pedes cheliferi. Alæ 4. cruciſ. — Scorpio aquat.
- Scorpio. — Pedes 8. Pedes cheliferi, ſerratæ. Alæ 4. latæ. — Scorpio terreſtris.

APTERA. *Alæ nullæ.*

- Pediculus. — Pedes 6. Antennæ capite breviores. — Pediculus humanus. Ped. ovinus. Ped. pilorum. Ped. pulicaris.
- Pulex. — Pedes 6. ſaltatorii. — Pulex vulgaris.
- Monoculus. — Pes 1. f. Antennæ biſidæ. — Pulex arborefc. Pyram. Monoculus Brandi. Apus Frifch.
- Acarus. — Pedes 8. articulis 8 conflantes. Oculi 2. Aut. minimæ. — Ricinus. Scorpio-araneus. Pedic. inguinalis. Pedic. ſcarabæi. Pedic. ſcabiei. Arenæus coccineus.
- Araneus. — Pedes 8. Oculi communiter 8. — Araneus. Tetaneta. Phalangium.
- Cancer. — Pedes 10. priores chelifermes. — Cancer. Albarus. ruginus. Squilla. Major. Bernata. Gammarus.
- Oniſcus. — Pedes 14. — Aſellus ofiſcus. Aſellus aquat.
- Scolopendra. — Pedes 20. & ultra. — Scolop. terreſtris. Scolop. marina. Julus.

VI. VERMES.

Corpora Muſculi ab una parte buſi cuidam ſolidæ affixi.

REPTILIA. Nuda, ecrudus deſtituta.

- Gordius. — Corpus filiforme, teres, ſimplex. — Sem aquaticus. Vena Medinæ.
- Tænia. — Corpus fubcanum, planum, articulatum. — Lumbricus longus.
- Lumbricus. — Corpus teres, annulo prominenti cinctum. — Inteſtinum terræ. Lumbricus latus. Alveria.
- Hirudo. — Corpus infernè planum, ſuperne convex. tentaculis inſtructum. — Sanguiſuga.
- Limax. — Corpus infernè planum, ſuperne convex. tentaculis inſtructum. — Limax.

TESTACEA. Habitaculo Lapideo inſtructa.

- Cochlea. — Teſta univalvis, ſpiralis, umbilicata. — Helix. Labyrinthus. Voluta. Cochlea varia. Buccinum. Lyra. Turbo. Cochlea. Strombus. Pileata. Murex. Purpura. Apicina. Nerita. Trochus.
- Nautilus. — Teſta univalvis, ſpiralis, multilocularis. — Nautilus. Orbiculatus. Linnæ.
- Cypræa. — Teſta univalvis, convoluta, rima longitudinali. — Concha Veneris. Porcellana.
- Haliotis. — Teſta univalvis, patula, labio concavo, perforato, ad angulum ſpiralis. — Auris marina.
- Patella. — Teſta univalvis, concava, ſimplex. — Patella.
- Dentalium. — Teſta univalvis, tubo, ſimplex. — Dentalium. Entalium. Tubus vermicul.
- Concha. — Teſta bivalvis. — Mytulus. Vulva marina. Pholas. Bucardium. Pecten. Chama. Solenes. Tellina. Pinna. Ostrea. Pectun. Mytilus. Pinna.
- Lepas. — Teſta multivalvis. Valvulæ duabus plures. — Concha anatifera. Verruca tubulata. Balanus tintinn.

ZOOPHYTA. Animalia mixta.

- Tethys. — Corpus forma variabile, molle, nudum. — Tethys. Holothurium. Penna marina.
- Echinus. — Corpus ſubrotundum, teſta tecta, aculeis mobilibus. — Echinus marinus.
- Aſterias. — Corpus radiatum, teſta tectum, ſubnum. — Stella marina. Stella oligonia. St. pentaphyllodes. St. polyphyllodes.
- Medusa. — Corpus orbiculatum, gelatinoſum, ſubtus fimbriatum. — Urtica marina. Ort. ramoſcularis. Ort. crinita. Ort. ulmaphyta.
- Sepia. — Corpus oblongum, interne oſſeum, octonis octo acetabulis donatum. — Sepia. Loligo.
- Microcosmus. — Corpus veſtis heterogeneis tectum. — Microcosmus marin.

source: http://upload.wikimedia.org/wikipedia/commons/b/bb/Linnaeus_-_Regnum_Animale_%281735%29.png

North American Product Classification System

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Introduction

In February 1999, the statistical agencies of Canada, Mexico, and the United States launched a joint multi-phase initiative to develop a comprehensive demand-oriented product classification, known as the North American Product Classification System (NAPCS). Work to date has focused on the products produced by service industries in 12 NAICS sectors 48-49 through 81. With that work nearing completion, this web page provides an overview of and progress report on the NAPCS initiative and presents the final versions of the product lists developed so far for the service industries included in those 12 sectors.

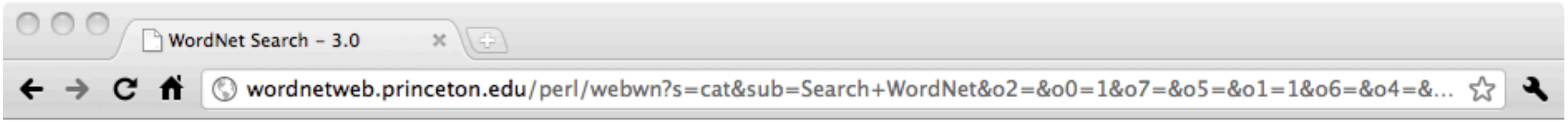
Overview and Progress Report

Final NAPCS Product Lists

- Description of product lists
- View PDF files of individual product lists
- Download sequential Excel file of all product lists

Thesaurus

- Associates the meaning of a term with the meaning of another term
- hypernym, hyponym, synonym, antonym



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Word to search for: cat Search WordNet

Display Options: (Select option to change) Change

Key: "S:" = Show Synset (semantic) relations, "W:" = Show Word (lexical) relations

Noun

- S: (n) **cat**, true cat (feline mammal usually having thick soft fur and no ability to roar: domestic cats; wildcats)
- S: (n) guy, **cat**, hombre, bozo (an informal term for a youth or man) "*a nice guy*"; "*the guy's only doing it for some doll*"
- S: (n) **cat** (a spiteful woman gossip) "*what a cat she is!*"
- S: (n) kat, khat, qat, quat, **cat**, Arabian tea, African tea (the leaves of the shrub Catha edulis which are chewed like tobacco or used to make tea; has the effect of a euphoric stimulant) "*in Yemen kat is used daily by 85% of adults*"
- S: (n) cat-o'-nine-tails, **cat** (a whip with nine knotted cords) "*British sailors feared the cat*"
- S: (n) Caterpillar, **cat** (a large tracked vehicle that is propelled by two endless metal belts; frequently used for moving earth in construction and farm work)
- S: (n) big cat, **cat** (any of several large cats typically able to roar and living in the wild)
- S: (n) computerized tomography, computed tomography, CT, computerized axial tomography, computed axial tomography, **CAT** (a method of examining body organs by scanning them with **X** rays and using a computer to construct a series of cross-sectional scans along a single axis)

Verb

- S: (v) **cat** (beat with a cat-o'-nine-tails)
- S: (v) vomit, vomit up, purge, cast, sick, **cat**, be sick, disgorge, regorge, retch, puke, barf, spew, spue, chuck, upchuck, honk, regurgitate, throw up (eject the contents of the stomach through the mouth) "*After drinking too much, the students vomited*"; "*He purged continuously*"; "*The patient regurgitated the food we gave him last night*"

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2010 MeSH

MeSH Descriptor Data

Return to Entry Page

Standard View. Go to Concept View; Go to Expanded Concept View

MeSH Heading	Heart
Tree Number	A07.541
Annotation	heart as pump, not tissue (MYOCARDIUM); qualif permitted: / anat / drug eff / embryol (FETAL HEART also exists) / growth / innerv (HEART CONDUCTION SYSTEM also exists) / microbiol / parasitol / physiol (see also ATRIAL FUNCTION & VENTRICULAR FUNCTION & their specifics; see also MYOCARDIAL CONTRACTION & its specifics) / physiopathol / rad eff / radiogr (do not confuse with ANGIOCARDIOGRAPHY) / radionuclide / virol; / blood supply = CORONARY VESSELS but consider also CORONARY CIRCULATION; / drug eff: consider also MYOCARDIAL DEPRESSANTS see ANTI-ARRHYTHMIA AGENTS & CARDIOTONIC AGENTS; / transpl = HEART TRANSPLANTATION: do not coord with TRANSPLANTATION, HOMOLOGOUS unless particularly discussed; / ultrasonogr = ECHOCARDIOGRAPHY or ECHOCARDIOGRAPHY, DOPPLER; inotropism: INOTROPISM, CARDIAC see MYOCARDIAL CONTRACTION & INOTROPIC AGENTS, POSITIVE CARDIAC are available but see MYOCARDIAL CONTRACTION note; chronotropism: see HEART RATE note; DIASTOLE & SYSTOLE are also available; heart-lung prep: index HEART / physiol (probably NIM); Manual 21.48+; carditis = MYOCARDITIS; mural thrombosis: index HEART DISEASE (IM) + THROMBOSIS (IM)
Scope Note	The hollow, muscular organ that maintains the circulation of the blood.

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women seek women
women seeking men
men seeking women
men seeking men
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eco m4m tax
educ money testing
etiquet motocy transg
feedbk music travel
film npo vegan
fitness open w4w

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rooms / shared
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housing wanted
housing swap
vacation rentals
parking / storage
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real estate for sale

for sale

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antiques auto parts
barter baby+kids
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sales / biz dev
salon / spa / fitness
security
skilled trade / craft
software / qa / dba
systems / network
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event creative
labor domestic
talent writing

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binghamton
buffalo
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ithaca
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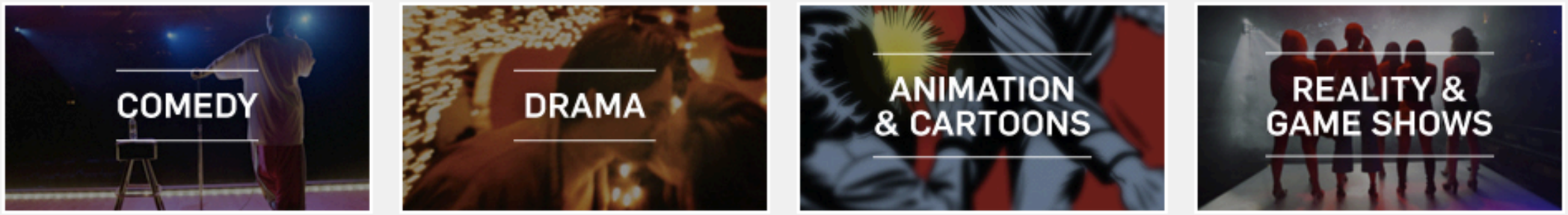

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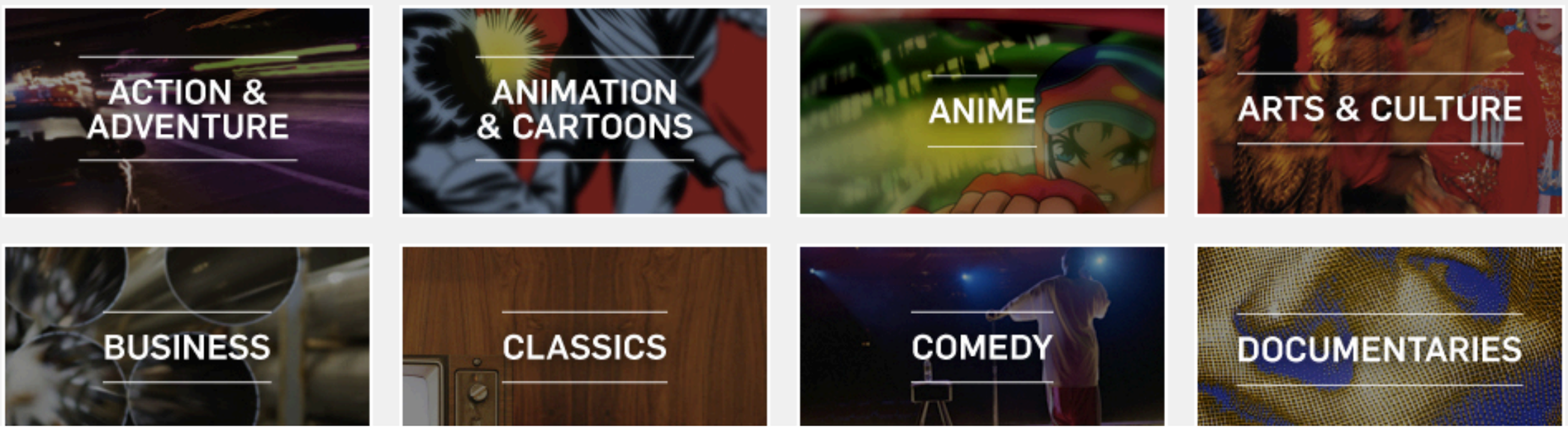


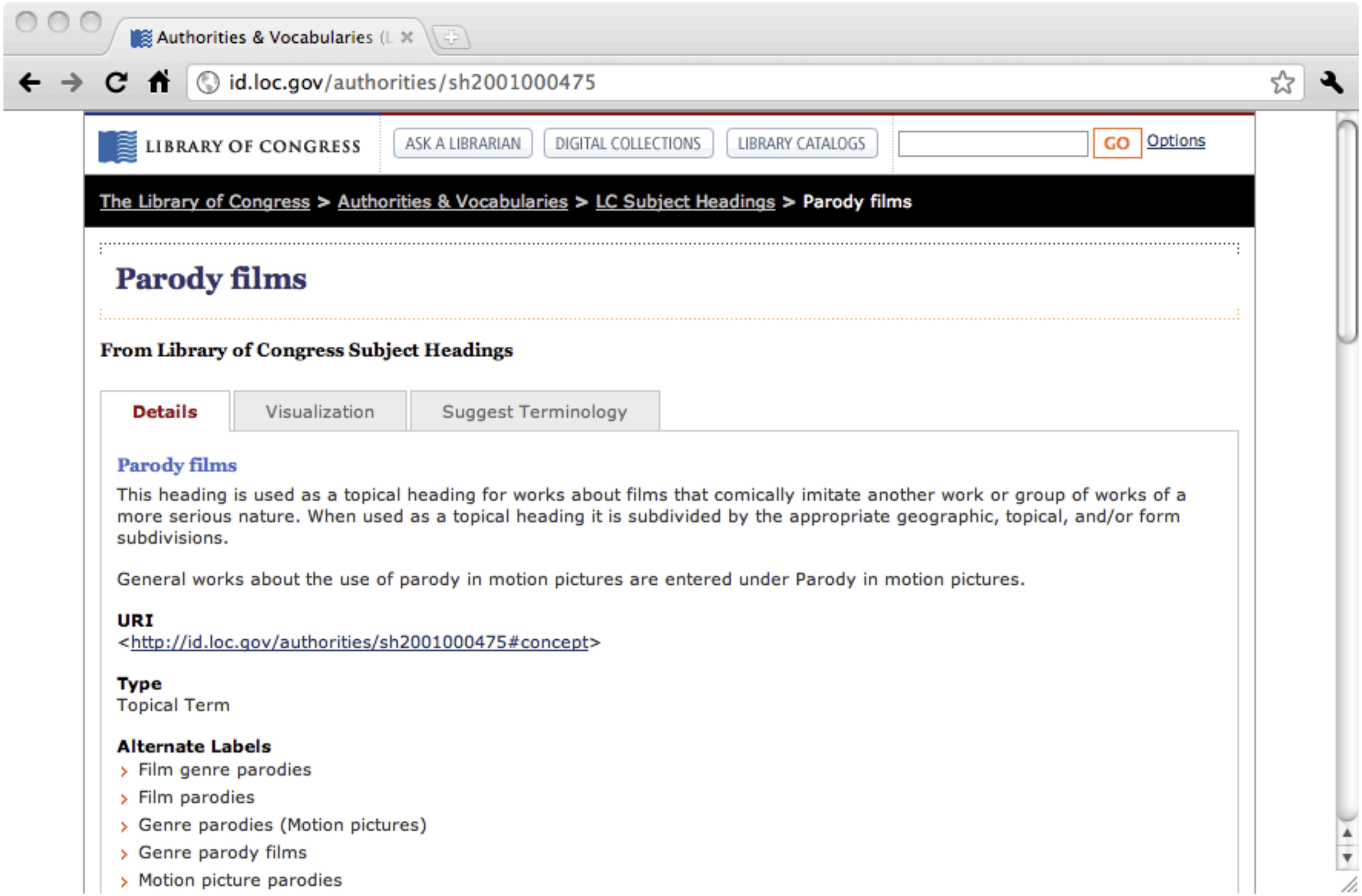
What is SKOS?

- A model for expressing the basic structure and content of concept schemes such as thesauri, classification schemes, taxonomies, folksonomies, and other similar types of controlled vocabularies
- Allows concepts to be composed and published as Linked Data on the Web
- Hides the complexity of OWL - easy to use

SKOS Concepts are...

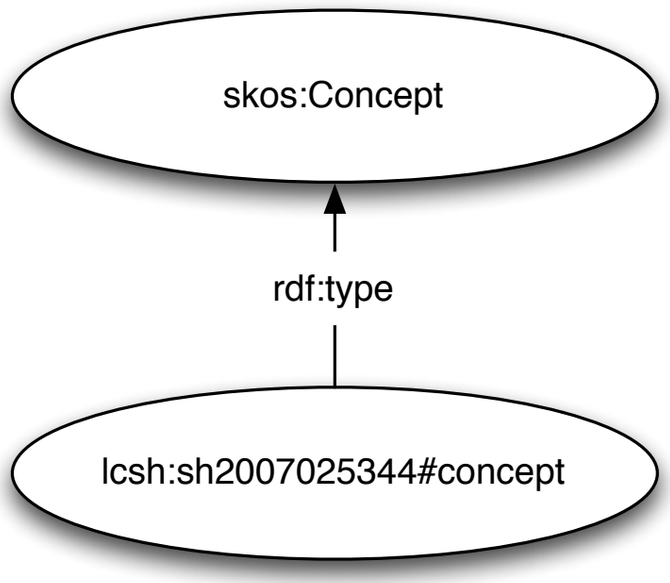
- ... identified by URIs
- ... labeled with 1..* natural language strings
- ... documented with various types of notes
- ... semantically linked to each other
- ... aggregated into concept schemes

Example SKOS Concept



skos:Concept

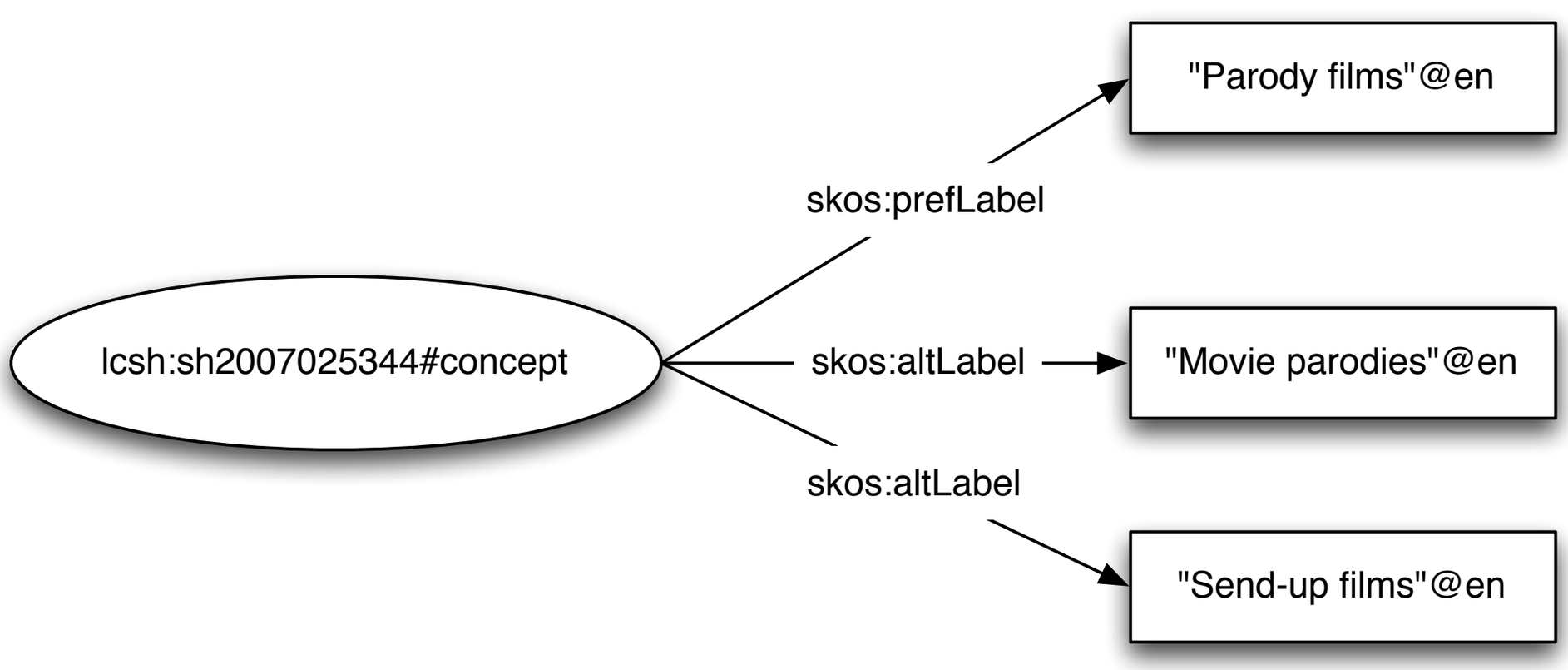
- Concepts are
  - the units of thought: ideas, meanings, categories of objects, etc.
  - abstract entities which are independent of the terms used to label them




```
@prefix skos: <http://www.w3.org/2004/02/skos/core#> .
@prefix lcsh: <http://id.loc.gov/authorities/> .
```

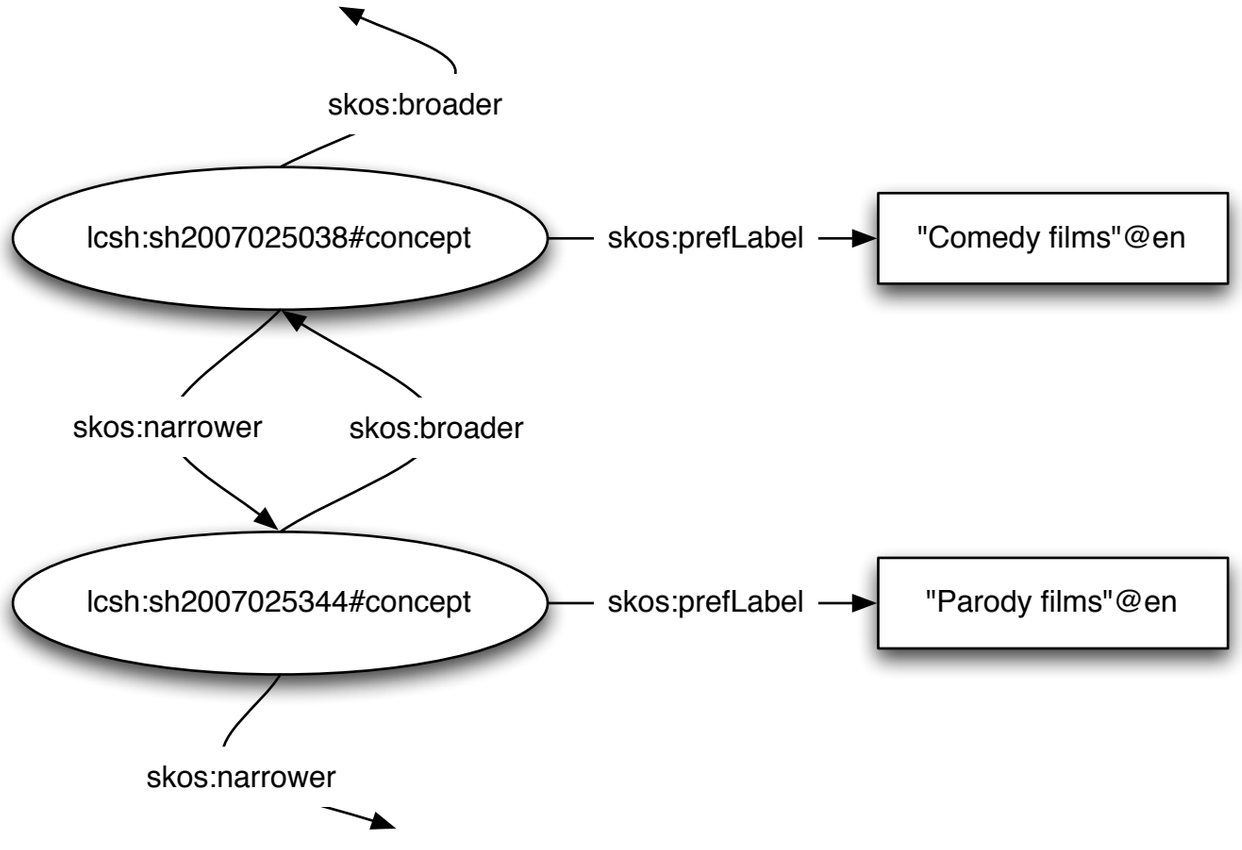
skos:(pref|alt|hidden)Label

- Labels refer to concepts' natural language(s)
  - skos:prefLabel: the preferred lexical label
  - skos:altLabel: alternative lexical labels (e.g., synonyms)
  - skos:hiddenLabel: labels useful for indexing (e.g., typos)



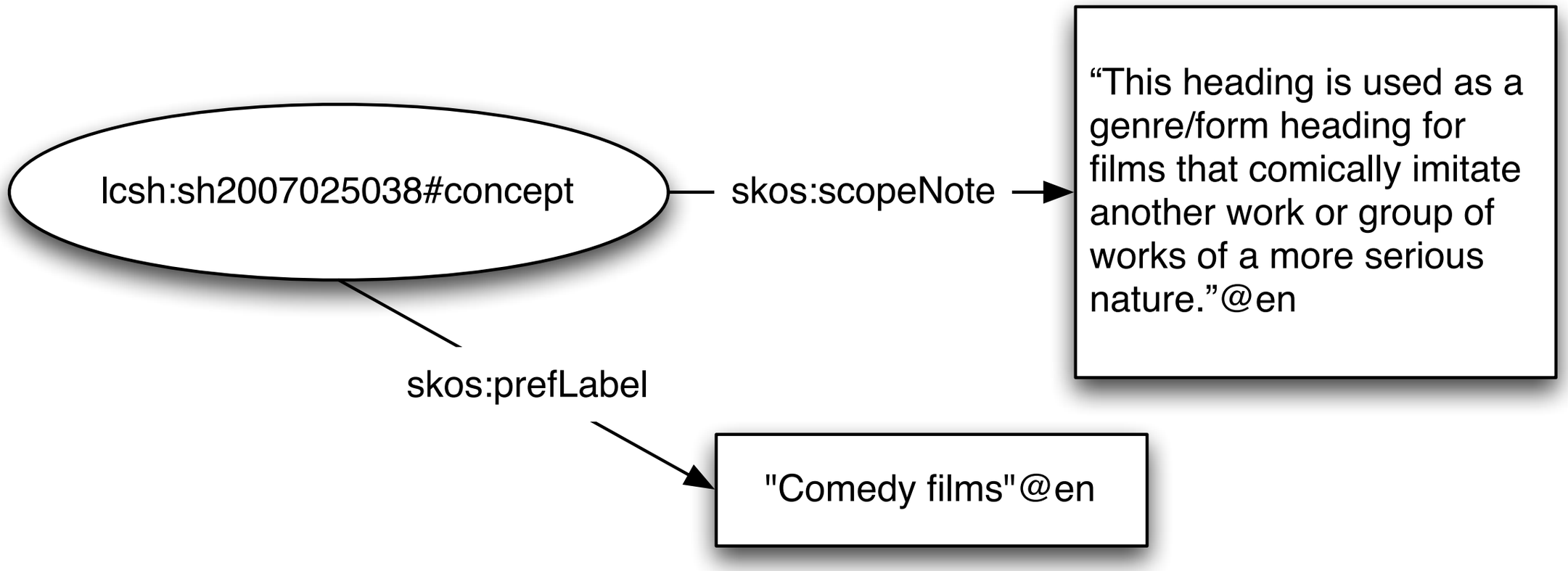
SKOS Semantic Relationships

- The meaning of a concept is also defined by its links to other concepts
  - skos:broader: hierarchical link to a more general concept
  - skos:narrower: hierarchical link to a more specific concept
  - skos:related: associative (non-hierarchical) link



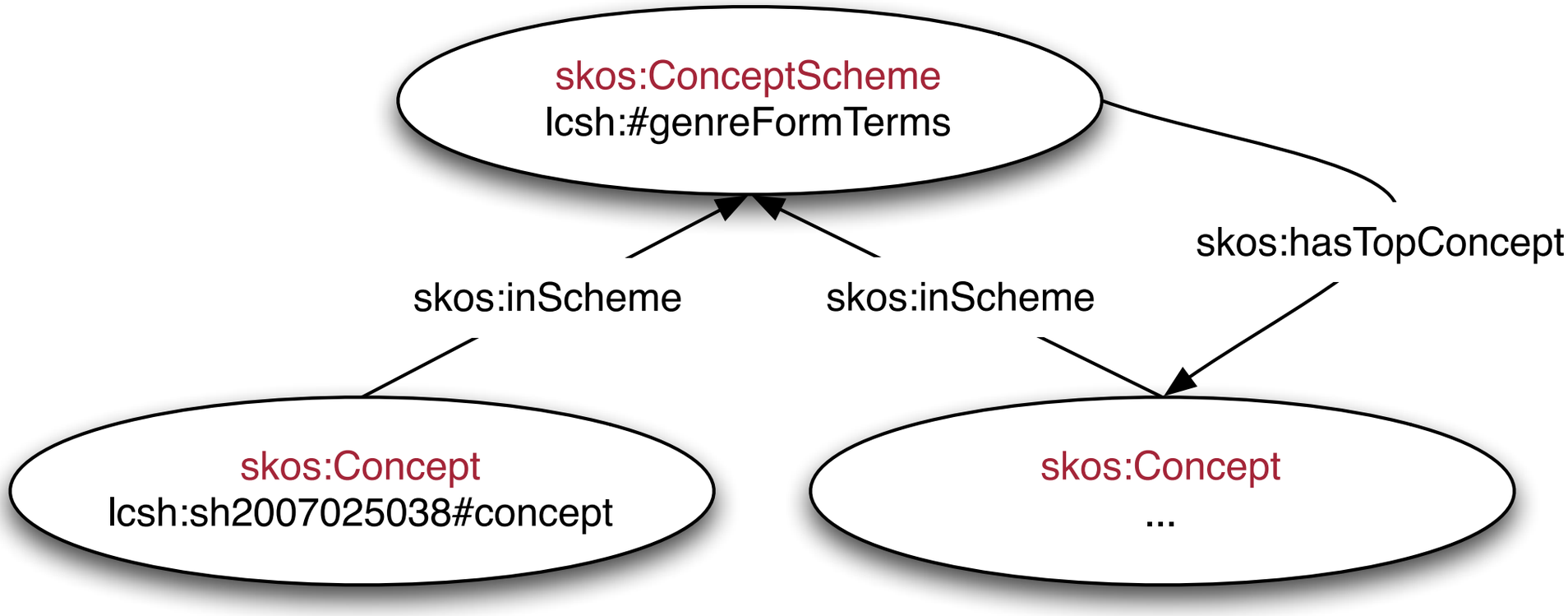
SKOS Documentary Notes

- Add further human-readable documentation
  - skos:scopeNote: info about intended meaning
  - skos:definition: complete explanation of meaning
  - skos:example: example concept use



skos:ConceptScheme

- Allow the organization of skos:Concepts in some Knowledge Organization Scheme (KOS)



Another Real-World Examples

- NY Times topics: http://topics.nytimes.com/
- Dereference and analyze "Jack Nicholson" @ New York Times
  - http://data.nytimes.com
  - http://data.nytimes.com/N57614112774312665 13

QUESTIONS & HOUSEKEEPING