

Publishing Pre-modern Chinese Classification Schemes (PCCS) as Linked Data

lessons learned from an experiment

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Overview of the experiment

- LAMP + Drupal + ARC2

- Data models

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:dc="http://purl.org/dc/elements/1.1/"
xmlns:skos="http://www.w3.org/2004/02/skos/core#">
```

- 10437 triples

- 15 classification schemes

七略

七录

隋書·經籍志

旧唐书·经籍志

新唐書藝文志

崇文總目

郡齋讀書志

遂初堂书目

直齐书录解题

文献通考经籍考

宋史艺文志

明史艺文志

四库全书总目提要

千顷堂書目

澹生堂藏書目

Formal Definition

A Pre-modern Chinese classification scheme (PCCS) is a organized set of categories with a hierarchical structure. It is usually a component of an individual bibliography work to index pre-modern Chinese books.

死六藝一百三家三千一百二十三篇三家一百五十九篇出重十

六藝之文樂以和神仁之表也詩以正言義之用也禮以明體明者著見故無訓也書以廣聽知之術也春秋以斷事信之符也五者蓋五常之道相須而備而易為之原故曰易不可見則乾坤或幾乎息矣蘇林曰不能坤道也言與天地為終始也至於五學世有變改猶五行之更用事焉師古曰古之學者耕且養三年而通一藝存其大體玩經文而已是故用日少而畜德多二十

易曰宓戲氏仰觀象於天俯觀法於地觀鳥獸之文與地之宜近取諸身遠取諸物於是始作八卦以通神明之德以類萬物之情師古曰下繫之辭也鳥獸之文至于殷周之際紂在上位逆天暴物文王以諸侯順命而行道天人之占可得而効於是重易六爻作上下篇孔子為之象象繫辭文言序卦之屬十篇故曰易道深矣人更三聖韋昭曰伏羲世歷三古孟康曰易繫辭曰然則伏羲為上古文王及秦燔書而易為筮卜之事傳者為中古孔子為下古及秦燔書而易為筮卜之事傳者不絕漢興田何傳之訖子宣元有施孟梁丘京氏列於學官而民間有費高二家之說劉向以中古文易經校

丁氏八篇名寬字子襄梁人也

古五子十八篇自甲子至壬子說易陰陽

淮南道訓二篇淮南王安聘明易者九人號九師說

古雜八十篇雜災異三十五篇神輪五篇圖一師古曰劉向別

錄云神輪者王道夫則災害生得則四海輪之祥瑞

孟氏京房十一篇災異孟氏京房六十六篇五鹿充宗

略說三篇京氏段嘉十二篇蘇氏曰東海人為博士師古曰蘇說是也嘉即京房

所從受易者也見儒林傳及劉向別錄

章句施孟梁丘氏各二篇

凡易十三家二百九十四篇

師古曰六有諸子略有詩賦略有兵書略有術數略有方技略今刪其要以備篇籍師古曰刪去浮冗取其指

易經十二篇施孟梁丘三家師古曰上下經及

易傳周氏二篇字王孫也

服氏二篇師古曰劉向別錄云服氏齊人號服光

楊氏二篇名何字叔元菑川人

蔡公二篇周王孫

韓氏二篇名嬰

王氏二篇同名

卷八	譜牒類	目錄類	地理類
卷九	儒家類	道家類	<small>案以上史部</small>
卷十	法家類	名家類	墨家類
	縱橫家類	農家類	雜家類
卷十一	小說家類		

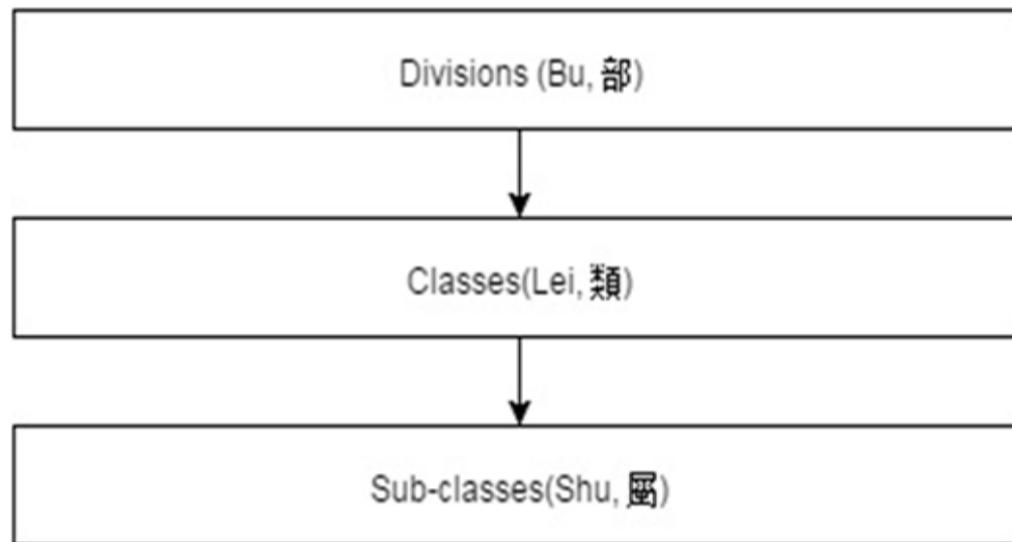
正史類	別史類	編年類
起居注類		
卷五	詔令類	偽史類
	典故類	雜史類
卷六	職官類	禮注類
		時令類
卷七	傳記類	法令類

直齋書錄解題目錄	武英殿聚珍版
卷一	易類
卷二	書類
卷三	詩類
	禮類
春秋類	孝經類
語孟類	
經解類	讖緯類
小學類	<small>案以上經部</small>
卷四	

The Structure of PCCSs

3-level Structure

- The top level being division, called Bu (部),
- The second level being categories, called Lei (類).
- Some schemes also have a third level called Shu (屬).



An example of a PCCS

經部																																		
易類	書類	詩類	禮類				春秋類	孝經類	五經總義類	四書類	樂類	小學類																						
			周禮	儀禮	禮記	三禮總義	通禮	雜禮				訓詁	字書	韻書																				
史部																																		
正史類	編年類	紀事本末類	別史類	雜史類	詔令奏議類	傳記類				史鈔類	載記類	時令類	地理類				職官類	政書類			目錄類	史評類												
					詔令	奏議	聖賢	名人	總錄	雜錄	別錄		總志	都會	郡縣	河渠	邊防	山川	古跡	雜記	遊記	外記	官制	官箴	通制	典禮	邦計	軍政	法令	考工	經籍	金石		
子部																																		
儒家類	兵家類	法家類	農家類	醫家類	天文演算法類	術數類					藝術類			譜錄類		雜家類					類書類	小說家類		釋家類	道家類									
					推步	算書	數學	占候	相宅	相墓	占卜	命書	相書	陰陽	五行	雜技術	書畫	琴譜	篆刻	雜技	器物	食譜	草木鳥獸蟲魚	雜物	雜學	雜考	雜說	雜品	雜纂	雜編		雜事	異聞	瑣語
集部																																		
楚辭	別集	總集	詩文評	詞曲																														
				詞集	詞選	詞話	詞譜	詞韻	南北曲																									

The classification scheme of the Siku Quanshu (四庫全書, Complete Library in Four Sections)

Challenge of Modeling PCCS in SKOS

Using SKOS

- to represent semantic relationships between categories
- to represent the structure of a classification scheme

But, However

Can we represent Pre-modern Chinese classification schemes just simply using SKOS data model?

The answer is

No,

as Hur-Li Lee (2010) argued, the Chinese traditional approach of bibliographic classification “is fundamentally different from the analytic model evolved from ancient Greek philosophy.” The purpose of pre-modern classification schemes is to distinguish and demonstrate varieties of scholarships as well as to examine and prove the roots of scholarly schools (辨章學術攷鏡源流), rather than to correspond to academic disciplines or areas of study. Designing of the structure of the classification scheme was significantly influenced by the compiler’s personal perspectives on scholarships.

- Lee, Hur-Li. "Organizing Knowledge the Chinese Way." Proceedings of the American Society for Information Science and Technology, November/December 2010: 1-7.

Example

Classic Books(經) skos:broader Philology(小學類)



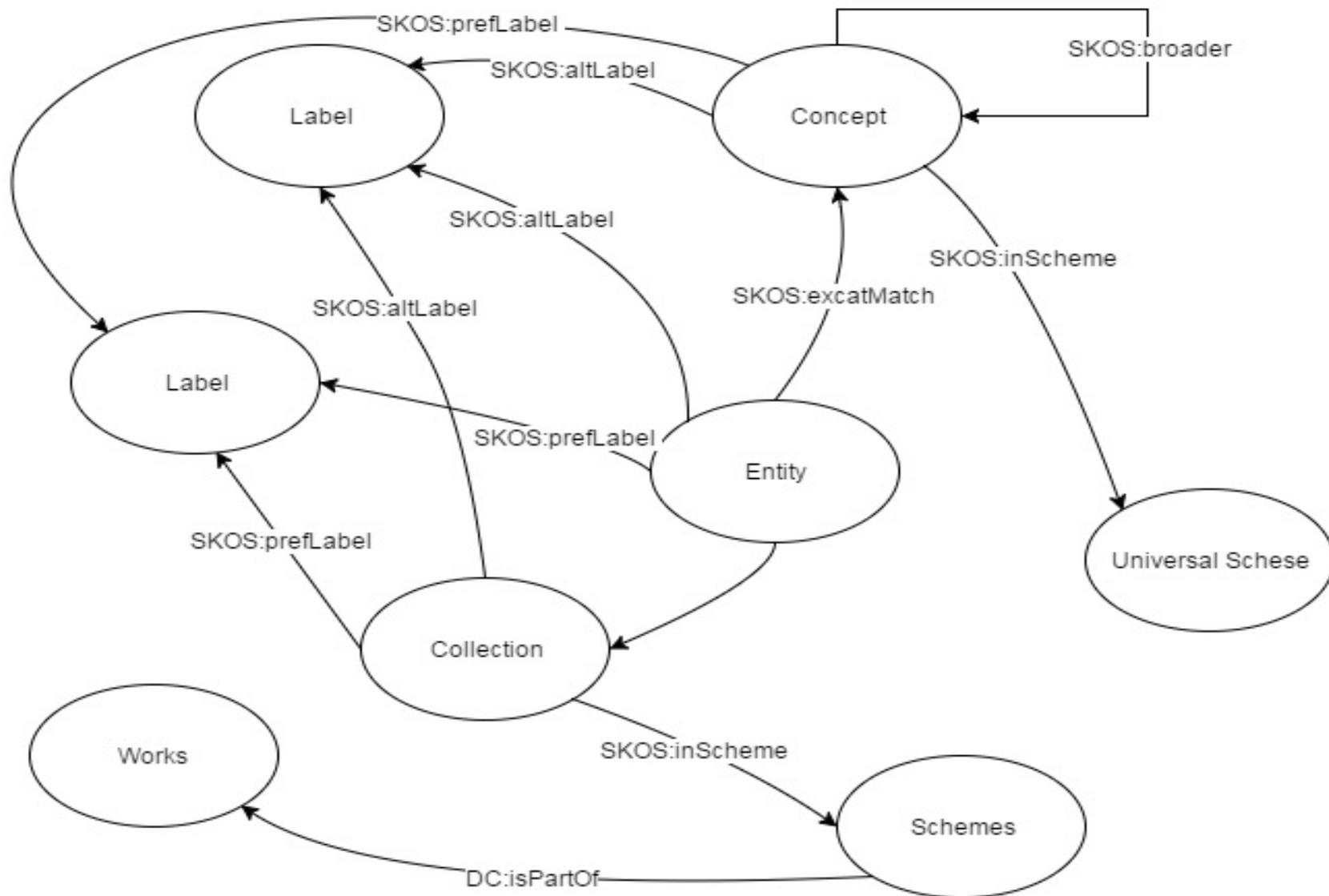
A solution

- An universal scheme has been introduced as a concept map to be used to demonstrate the logical relationships among the elements of PCCS.
- The scheme consists of 78 core elements with a hierarchical relationship to each other.

Classic(經)	Changes(易類)
	Ancient Documents(書類)
	Poetry(詩類)
	Ritual(禮類)
	Music(樂類)
	Spring and autumn annals(春秋類)
	Four Books(四書類)
	Classic of filial piety(孝類)
	Prophecy(讖緯類)
	Commentaries on the classic(經解類)
Philology(小學類)	Exegesis(訓詁)
	Character Dictionaries(字書)
	Phonology(韻書)

```
<?xml version="1.0"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:dc="http://purl.org/dc/elements/1.1/"
xmlns:skos="http://www.w3.org/2004/02/skos/core#">
<rdf:Description rdf:about="http://gugee.info/cnclass/universal/con010000" >
<rdf:type rdf:resource="http://www.w3.org/2004/02/skos/core#Concept"/>
<skos:inScheme rdf:resource="http://gugee.info/cnclass/universal/scheme"/>
<skos:prefLabel xml:lang="en">Classic</skos:prefLabel>
<skos:prefLabel xml:lang="zh">經</skos:prefLabel>
<skos:topConceptOf rdf:resource="http://gugee.info/cnclass/universal/scheme"/>
</rdf:Description>
<rdf:Description rdf:about="http://gugee.info/cnclass/universal/con010100" >
<rdf:type rdf:resource="http://www.w3.org/2004/02/skos/core#Concept"/>
<skos:inScheme rdf:resource="http://gugee.info/cnclass/universal/scheme"/>
<skos:prefLabel xml:lang="en">Changes</skos:prefLabel>
<skos:prefLabel xml:lang="zh">易類</skos:prefLabel>
<skos:broader rdf:resource="http://gugee.info/cnclass/universal/con010000"/>
</rdf:Description>
<rdf:Description rdf:about="http://gugee.info/cnclass/universal/con010200" >
<rdf:type rdf:resource="http://www.w3.org/2004/02/skos/core#Concept"/>
<skos:inScheme rdf:resource="http://gugee.info/cnclass/universal/scheme"/>
<skos:prefLabel xml:lang="en">Ancient Documents</skos:prefLabel>
<skos:prefLabel xml:lang="zh">書類</skos:prefLabel>
<skos:broader rdf:resource="http://gugee.info/cnclass/universal/con010000"/>
</rdf:Description>
</rdf:RDF>
```


Data Model



Data Model

A pre-modern Chinese classification scheme is a set of entities

Each entity is a concept

Each entity must have properties or attributes

Each entity must have a label

Each entity must have a label with Chinese language attribute

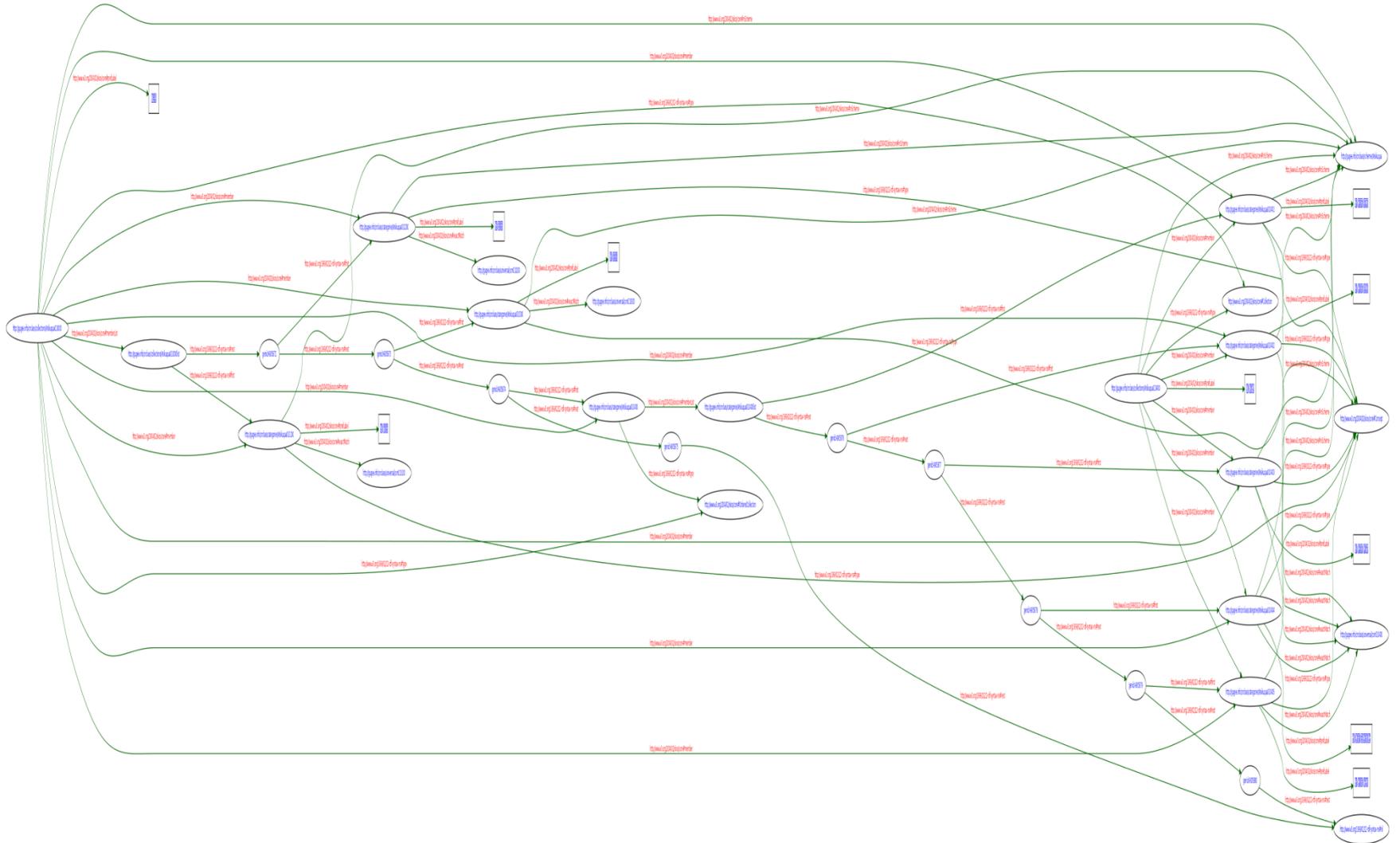
Each entity must have an exactMatch relationship with a concept in Universal Scheme

Each entity must be a member of collection

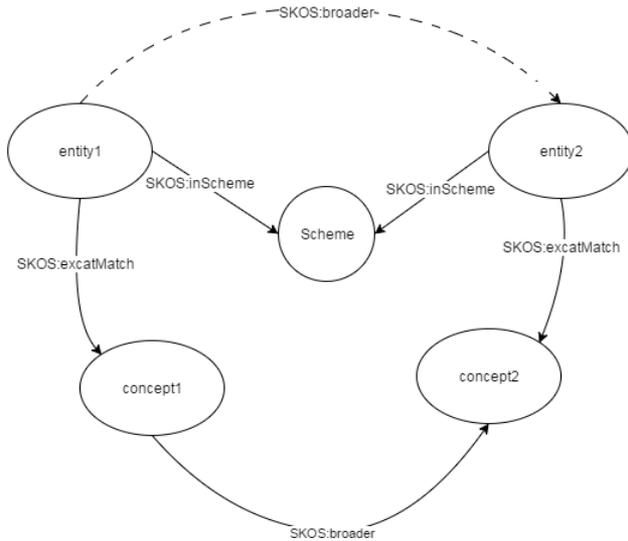
A Bu is an entity but also an Ordered Collection of entities and other ordered collections

Each scheme is a part of a bibliography work

Example of Siku first division



Semantic Relations



a := category b := relation
cp1,cp2 := concept sch :=scheme

PREFIX dc: <<http://purl.org/dc/elements/1.1/>>.

PREFIX rdf: <<http://www.w3.org/1999/02/22-rdf-syntax-ns#>> .

PREFIX skos: <<http://www.w3.org/2004/02/skos/core#>>.

SELECT DISTINCT ?a ?b WHERE

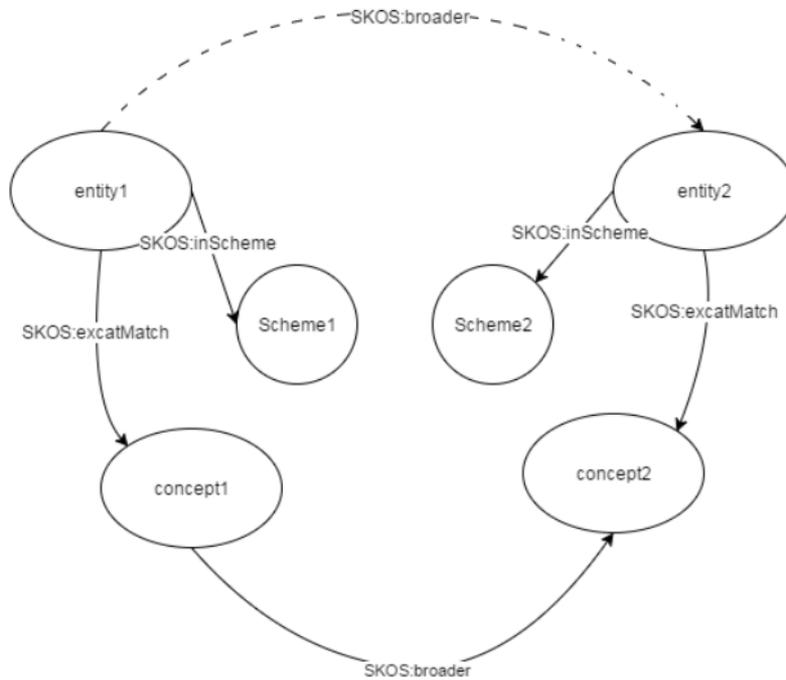
{<<http://gugee.info/cnclass/universal/con010900>> skos:inScheme ?sch. ?a skos:inScheme ?sch .

<http://gugee.info/cnclass/universal/con010900>> skos:exactMatch ?cp1 .

?a skos:exactMatch ?cp2 .

?cp1 ?b ?cp2 .}

Mapping (match)



a := category

cp1 := concept sch1,sch2 :=scheme

PREFIX dc: <http://purl.org/dc/elements/1.1/>.

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .

PREFIX skos: <http://www.w3.org/2004/02/skos/core#>.

SELECT DISTINCT ?a ?b WHERE

{<http://gugee.info/cnclass/universal/con010900> skos:inScheme ?sch1.

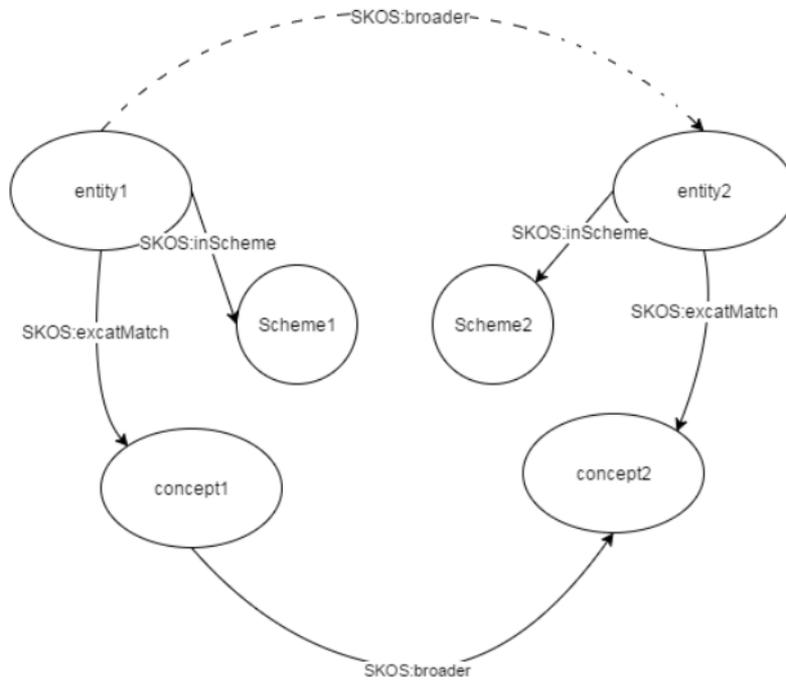
?a skos:inScheme ?sch2 .

<http://gugee.info/cnclass/universal/con010900> skos:exactMatch ?cp1 .

?a skos:exactMatch ?cp1 .

.}

Mapping (relations)



a := category b := relation
cp1 := concept sch1,sch2 :=scheme

PREFIX dc: <<http://purl.org/dc/elements/1.1/>>.

PREFIX rdf: <<http://www.w3.org/1999/02/22-rdf-syntax-ns#>> .

PREFIX skos: <<http://www.w3.org/2004/02/skos/core#>>.

SELECT DISTINCT ?a ?b WHERE

{<<http://gugee.info/cnclass/universal/con010900>> skos:inScheme ?sch1.

?a skos:inScheme ?sch2 .

<<http://gugee.info/cnclass/universal/con010900>> skos:exactMatch ?cp1 .

?a skos:exactMatch ?cp2 .

?cp1 ?b ?cp2.}

Hierarchical structure

SKOS: OrderedCollection

SKOS: skos:memberList

rdf:first

rdf:rest

```
<rdf:Description rdf:about="http://gugee.info/cnclass/collections/Wsikuqual"
  <rdf:type rdf:resource="http://www.w3.org/2004/02/skos/core#OrderedCollection"
  <skos:memberList rdf:resource="http://gugee.info/cnclass/collections/Wsikuqual"
  </rdf:Description>
```

```
<rdf:Description rdf:about="http://gugee.info/cnclass/collections/Wsikuqual"
  <rdf:first rdf:resource="http://gugee.info/cnclass/categories/Wsikuqual"
  <rdf:rest>
```

```
<rdf:Description>
  <rdf:first rdf:resource="http://gugee.info/cnclass/categories/Wsikuqual"
  <rdf:rest>
```

```
<rdf:Description>
  <rdf:first rdf:resource="http://gugee.info/cnclass/categories/Wsikuqual"
  <rdf:rest>
```

```
<rdf:Description>
  <rdf:first rdf:resource="http://gugee.info/cnclass/categories/Wsikuqual"
  <rdf:rest>
```

```
<rdf:Description>
```

Query in hierarchical structure

PREFIX dc: <http://purl.org/dc/elements/1.1/>.

PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .

PREFIX skos: <http://www.w3.org/2004/02/skos/core#>.

SELECT DISTINCT * WHERE

{<http://gugee.info/cnclass/collections/Wqiluqil020000> skos:memberList ?b .

?b rdf:first ?x1 .?b rdf:rest ?x2 .?x2 rdf:first ?x3 .?x2 rdf:rest ?x4 .?x4 rdf:first ?x5

.?x4 rdf:rest ?x6

.?x6 rdf:first ?x7 .

?x6 rdf:rest ?x8 .

?x8 rdf:first ?x9 .

?x8 rdf:rest ?x10 .}

PHP example

```
<?php
include_once('ARC2.php');
$config=ARC2::setconfig();
$store = ARC2::getStore($config);
if (!$store->isSetUp()) {
    $store->setUp();
}
$prefix= 'PREFIX dc: <http://purl.org/dc/elements/1.1/>. PREFIX rdf:
<http://www.w3.org/1999/02/22-rdf-syntax-ns#> . PREFIX skos:
<http://www.w3.org/2004/02/skos/core#>. SELECT DISTINCT * WHERE {';
$q = '<http://example.coms/Wqilujil020000> skos:memberList ?b .';
$q .= '?b rdf:first ?x1 .';
$q .= "?b rdf:rest ?x2 .";
$q .= "?x2 rdf:first ?x3 .";
$q .= "?x2 rdf:rest ?x4 .";
$q .= "?x4 rdf:first ?x5 .";
$q .= "?x4 rdf:rest ?x6 .";
$q .= "?x6 rdf:first ?x7 .";
$q .= "?x6 rdf:rest ?x8 .";
$q .= "?x8 rdf:first ?x9 .";
$q .= "?x8 rdf:rest ?x10 .";
$q = $prefix . $q . "}";
$rows = $store->query($q, 'rows');
echo $q;
print_r($rows);

?>
```

Thank you!