Phase 20 Demo : bigcup (Distributed Union)

Example 1 : Basic bigcup

bigcup S is the union of all sets in the set of sets S:

$[X]$

$\mathrm{S} == \mathbb{P}\,\mathbb{P}\,X$

$$\begin{array}{|l} allElements : S \to \mathbb{P}\ X \\ \hline \forall\, s : S \bullet allElements(s) = \bigcup s \end{array}$$

Example 2 : bigcup with ran

Combining bigcup with ran to get all elements from a relation's range:

$[UserId, SongId]$

$$\begin{array}{|l} loved : UserId \pfun \mathbb{F}\ SongId allLovedSongs : \mathbb{F}\ SongId \\ \hline allLovedSongs = \bigcup \operatorname{ran} loved \end{array}$$

Example 3 : Set difference with bigcup (Solution 50 a)

Users who are not subscribers of any playlist:

$[PlaylistId, UserId]$

$$\begin{array}{|l} users : \mathbb{F}\ UserId playlistSubscribers : PlaylistId \pfun \mathbb{F}_1\ UserId nonSubscribers : \mathbb{F}\ UserId \\ \hline nonSubscribers = users \setminus \bigcup \operatorname{ran} playlistSubscribers \end{array}$$

Example 4 : Nested bigcup

bigcup can be nested for multi-level set structures:

$[N]$

$$\begin{array}{|l} nested : \mathbb{P}\,\mathbb{P}\,\mathbb{P}\,\mathbb{N} \\ \hline \bigcup\bigcup nested(subseteq)(\mathbb{N}) \end{array}$$