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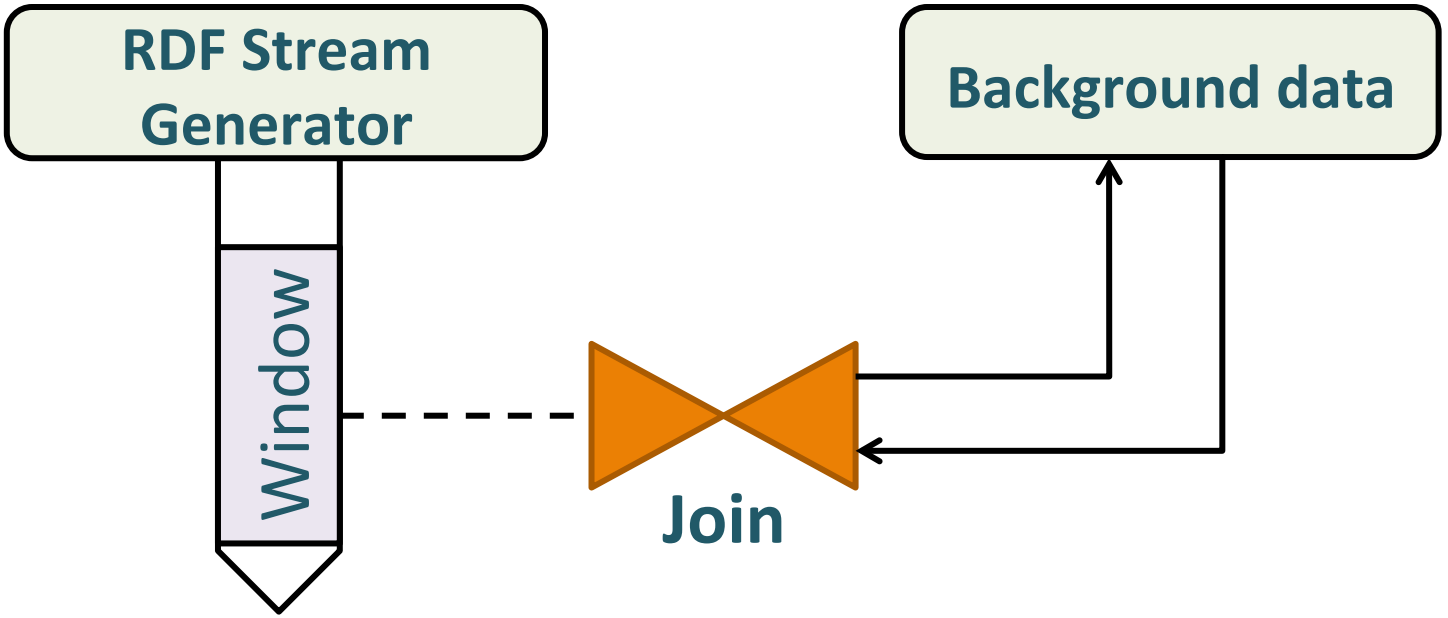
On Combining RDF Streams and Remotely Stored Background Data

S.Dehghanzadeh, D. Dell'Aglio, S. Gao,
E. Della Valle, **A. Mileo**, A. Bernstein

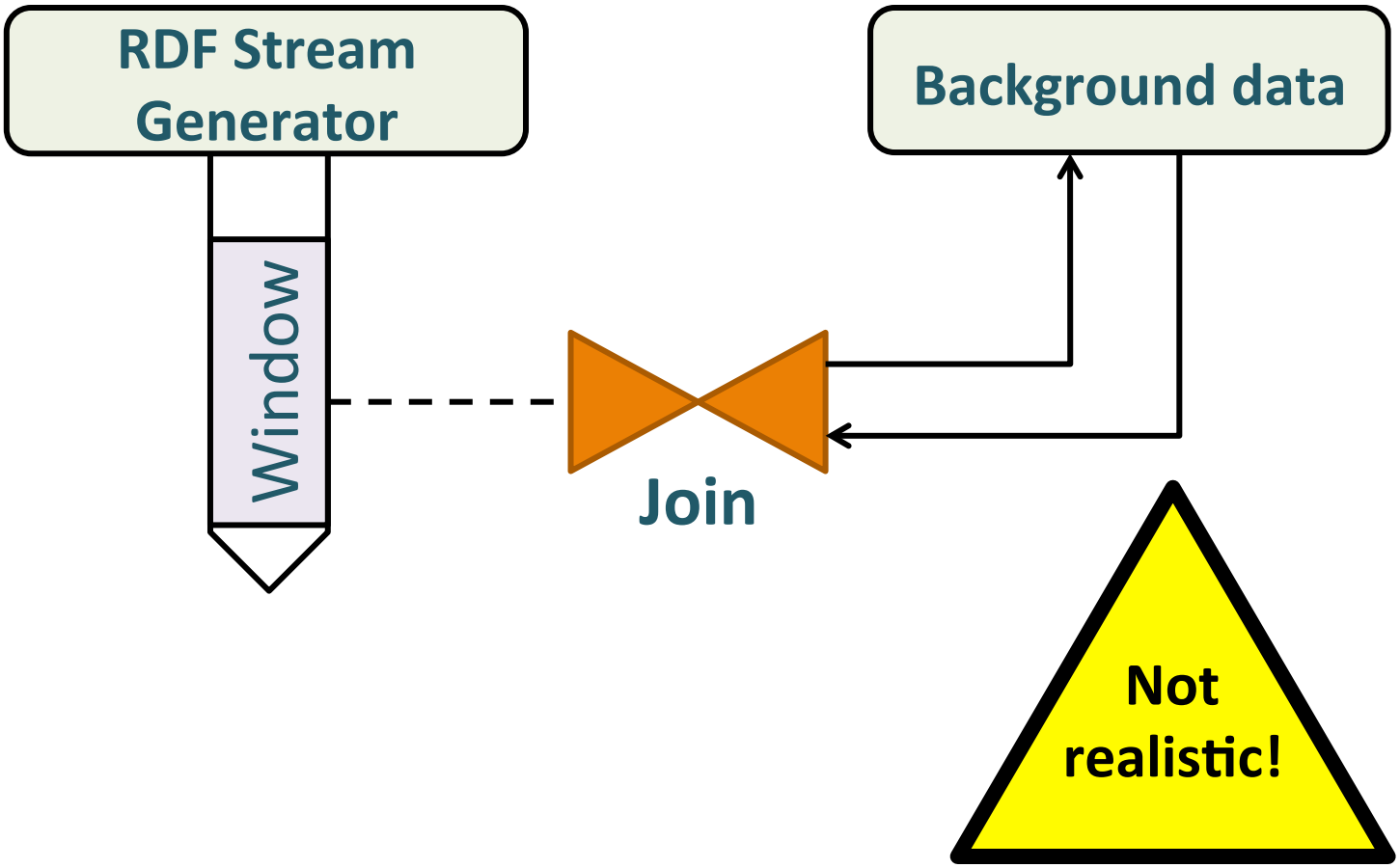
Overview

Evaluation of **Continuous Queries** where RDF streams are combined with background data.



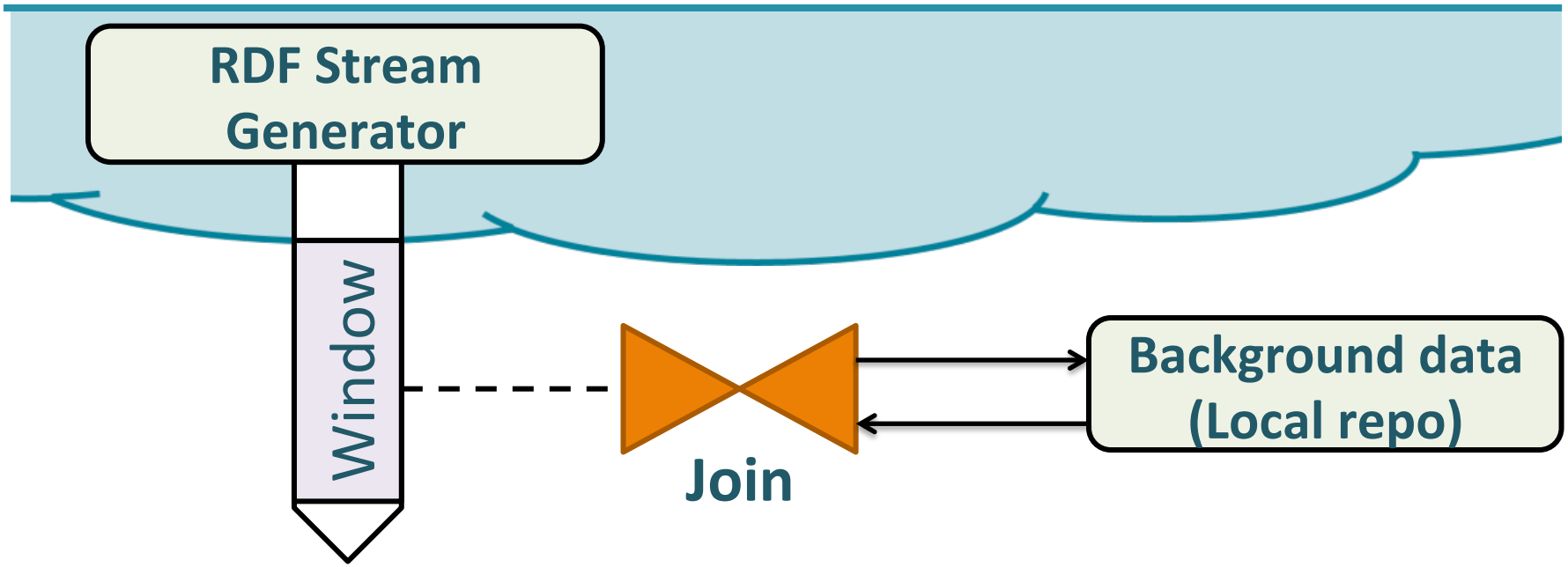
Initial RSP research (2009), …

Assumption: Background data is **static**



… RSP research progresses (2011), …

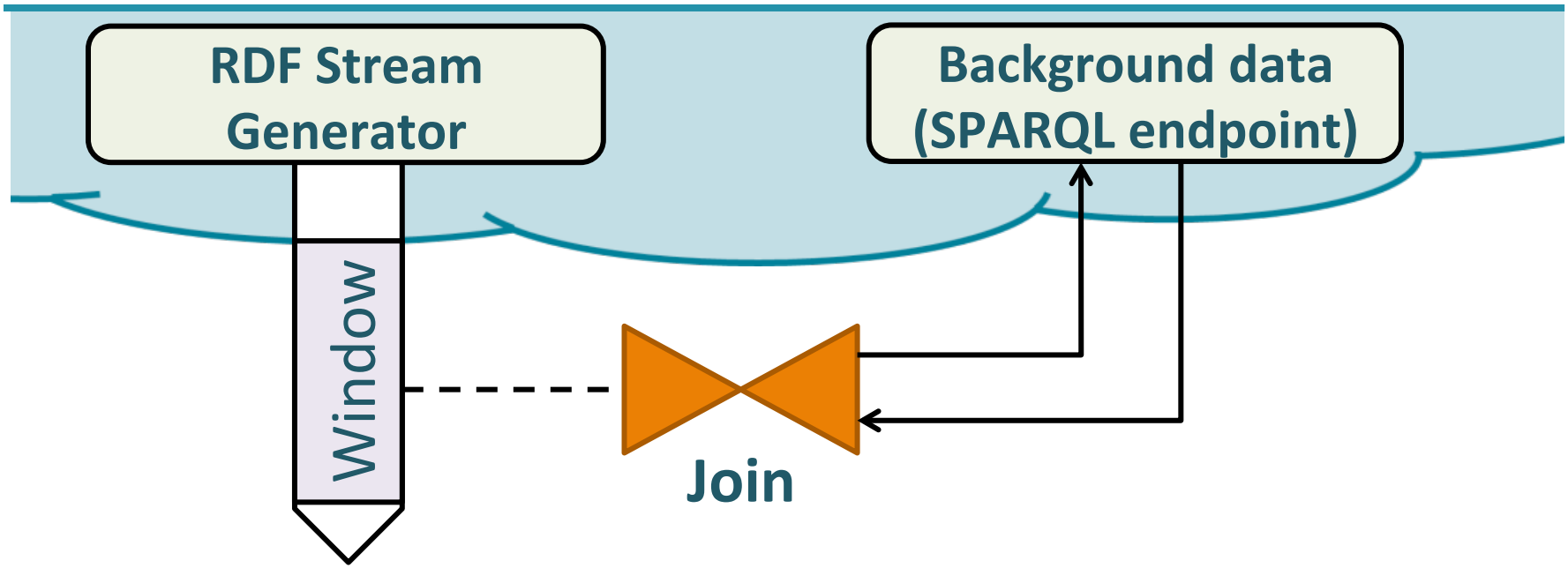
Assumption: Background data ~~is static~~ **changes** and it is stored **locally**



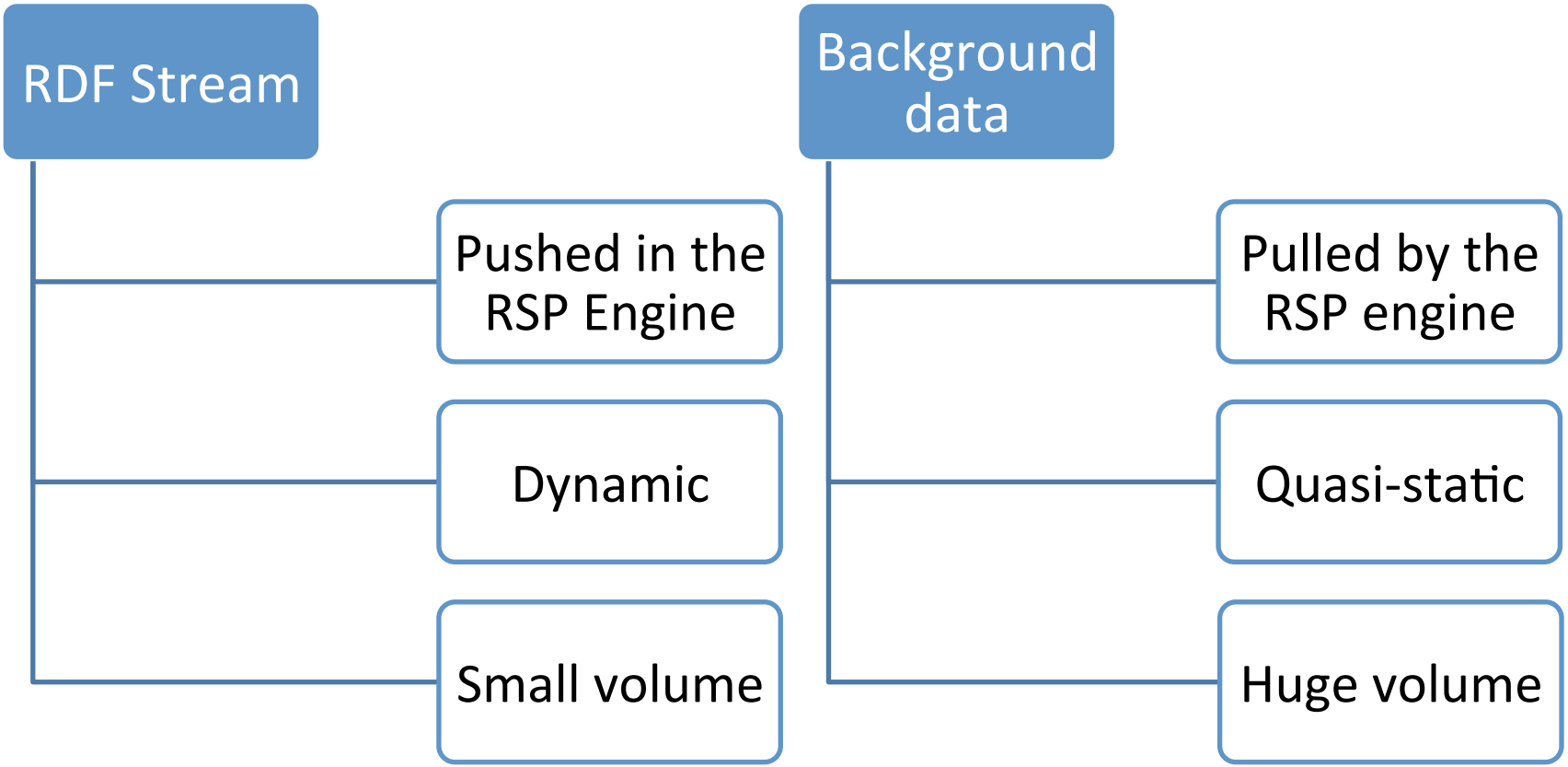
And the *Web*?

… RSP research goes further (2015)

Assumption: Background data ~~is static~~ **changes** and it is stored ~~locally~~ on the **Web**

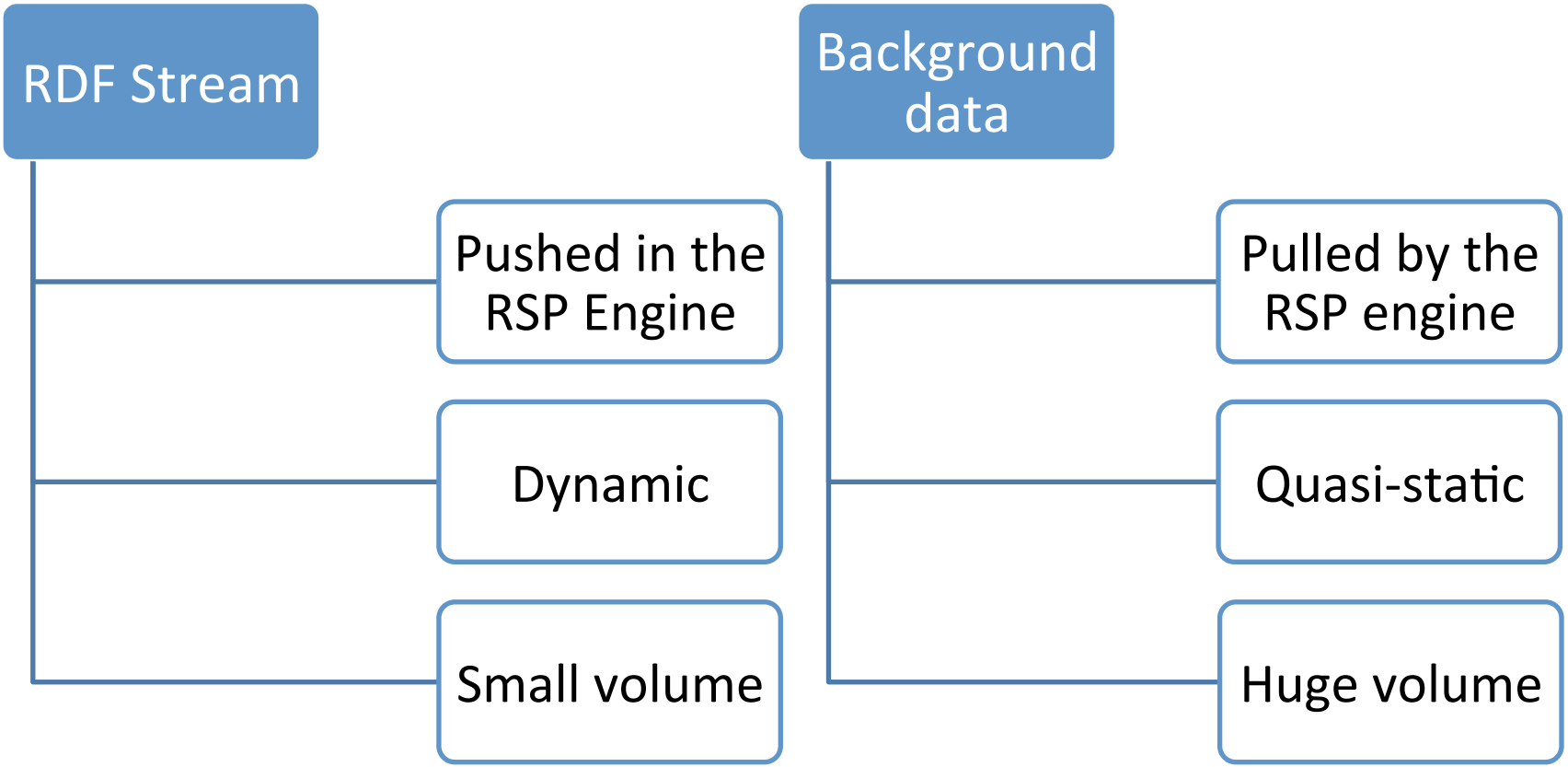


Streaming data vs Background data



Is it possible to **avoid** a **continuous access** to the BKG data?

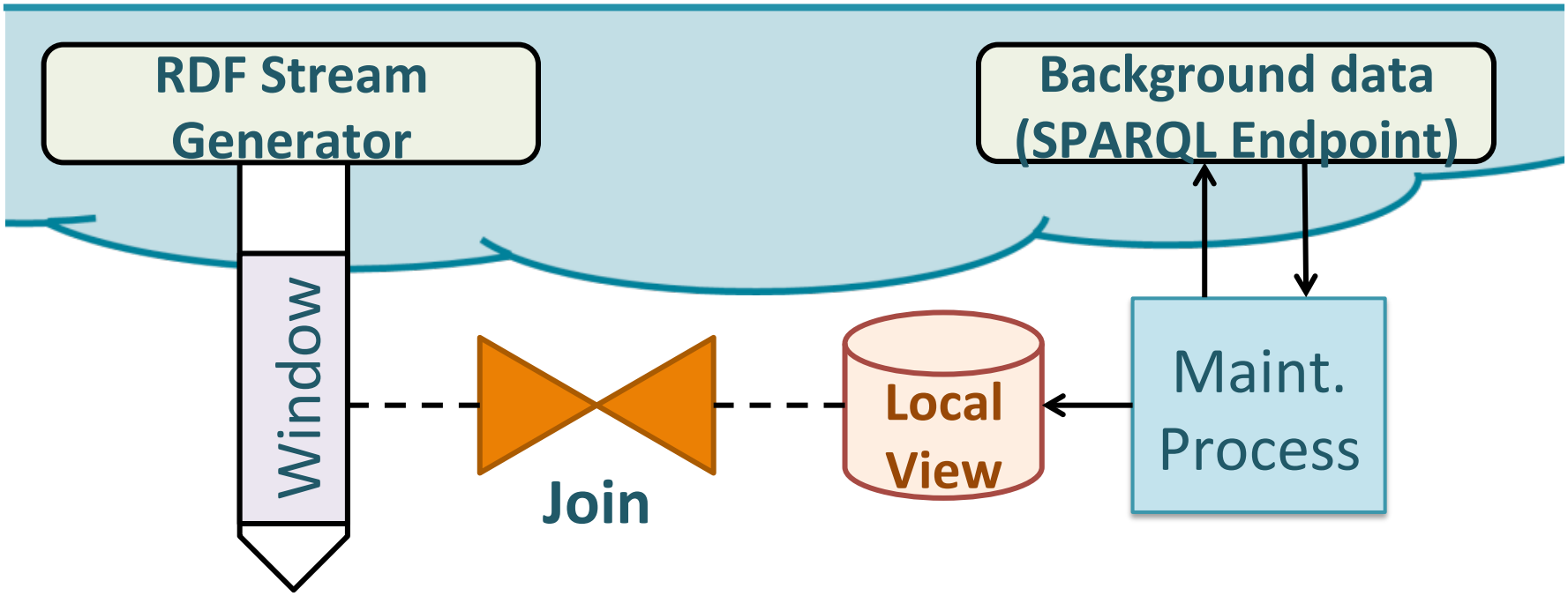
Streaming data vs Background data



In other words: **what** to pull and **when** to pull BKG data?

Views and Maintenance processes

A **Local View (caching)** of data is key but when data changes, the local view becomes **stale.**



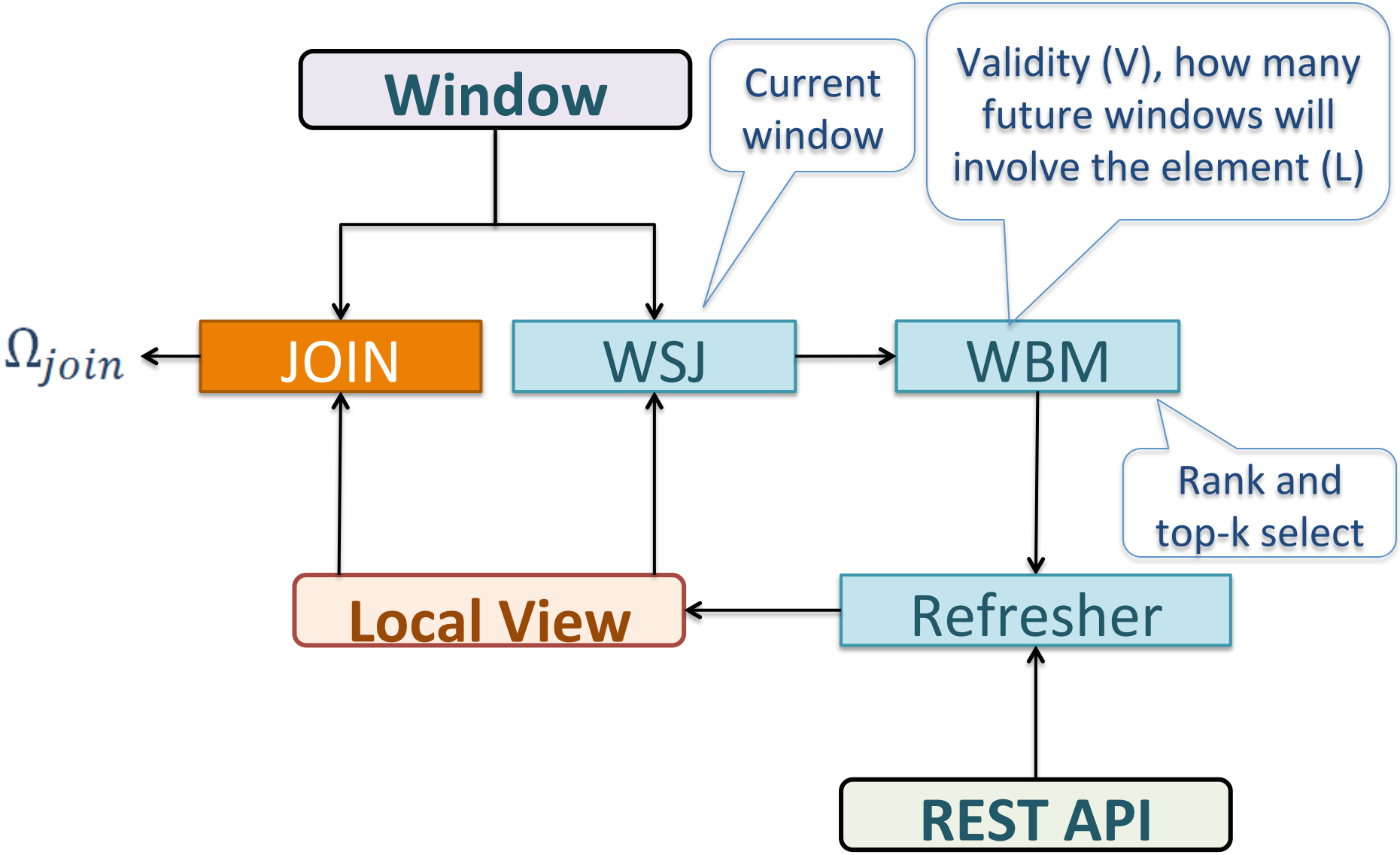
How to design a **Maintenance Process** to refresh the local view?

Requirements

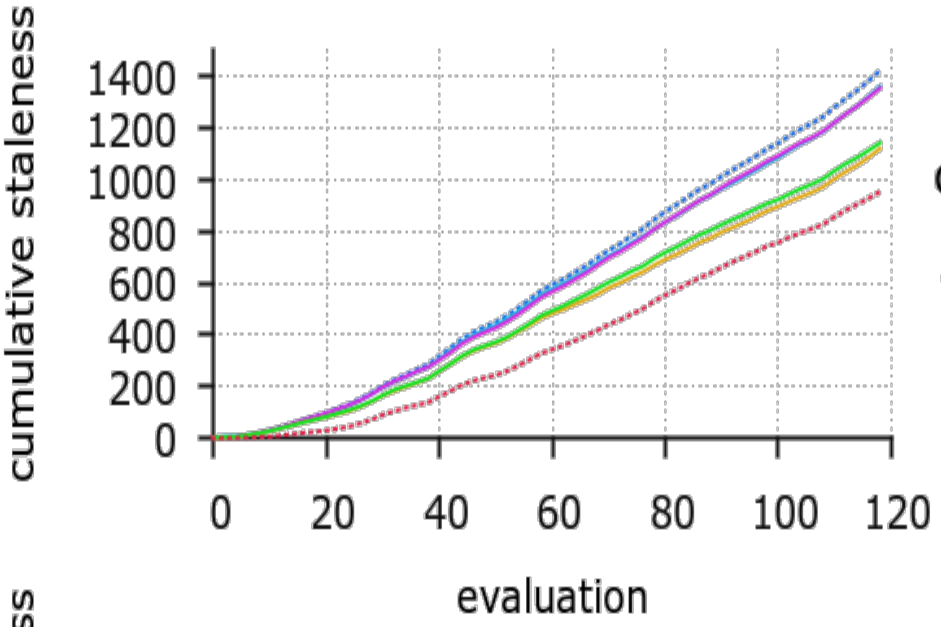
The Maintenance Process

1. should take into account the **change rates** of the data elements in the REST API;
2. should consider the **dynamicity** of the change rate values;
3. should satisfy the **Quality of Service constraints** on responsiveness and freshness of the answer;
4. may consider the **sliding window** operator.

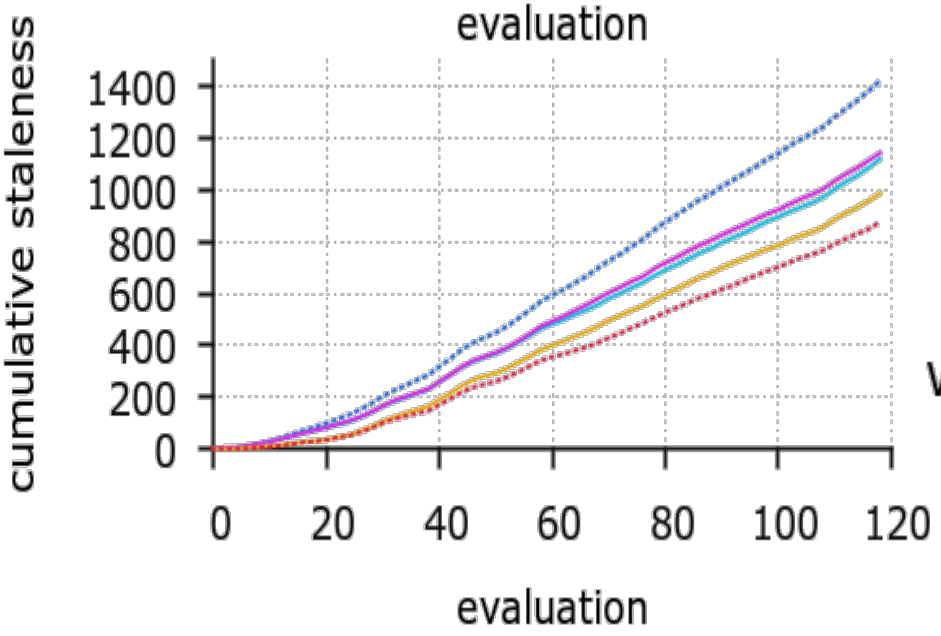
Initial solution: WSJ+WBM



Experiments



WSJ



WBM

Future work

- Future directions:
  - Design and development of adaptive caches
    - Implementation in C-SPARQL/CQELS
  - Queries with multiple SPARQL endpoints invocations
- Open challenges:
  - Extensions in the Query Language?
    - Quality of Service constraints – Freshness, Responsiveness, Precision, Recall, etc.
  - Extension of SPARQL endpoints?
    - To produce update streams (sparqlPuSH?)
    - Descriptions about the dynamicity of the data, rate limits, etc.

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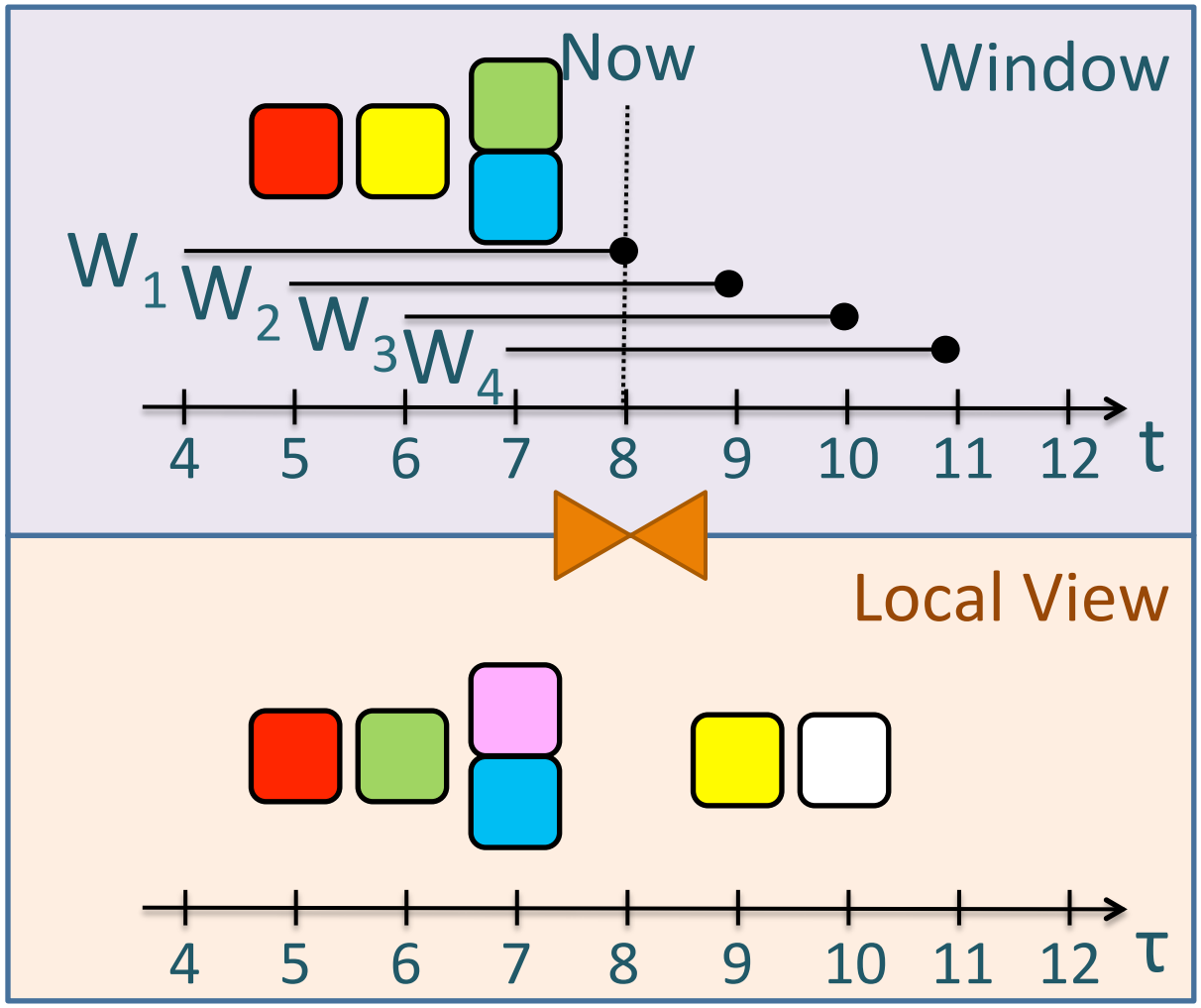
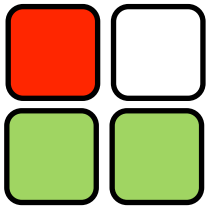
Backup Slides

Example



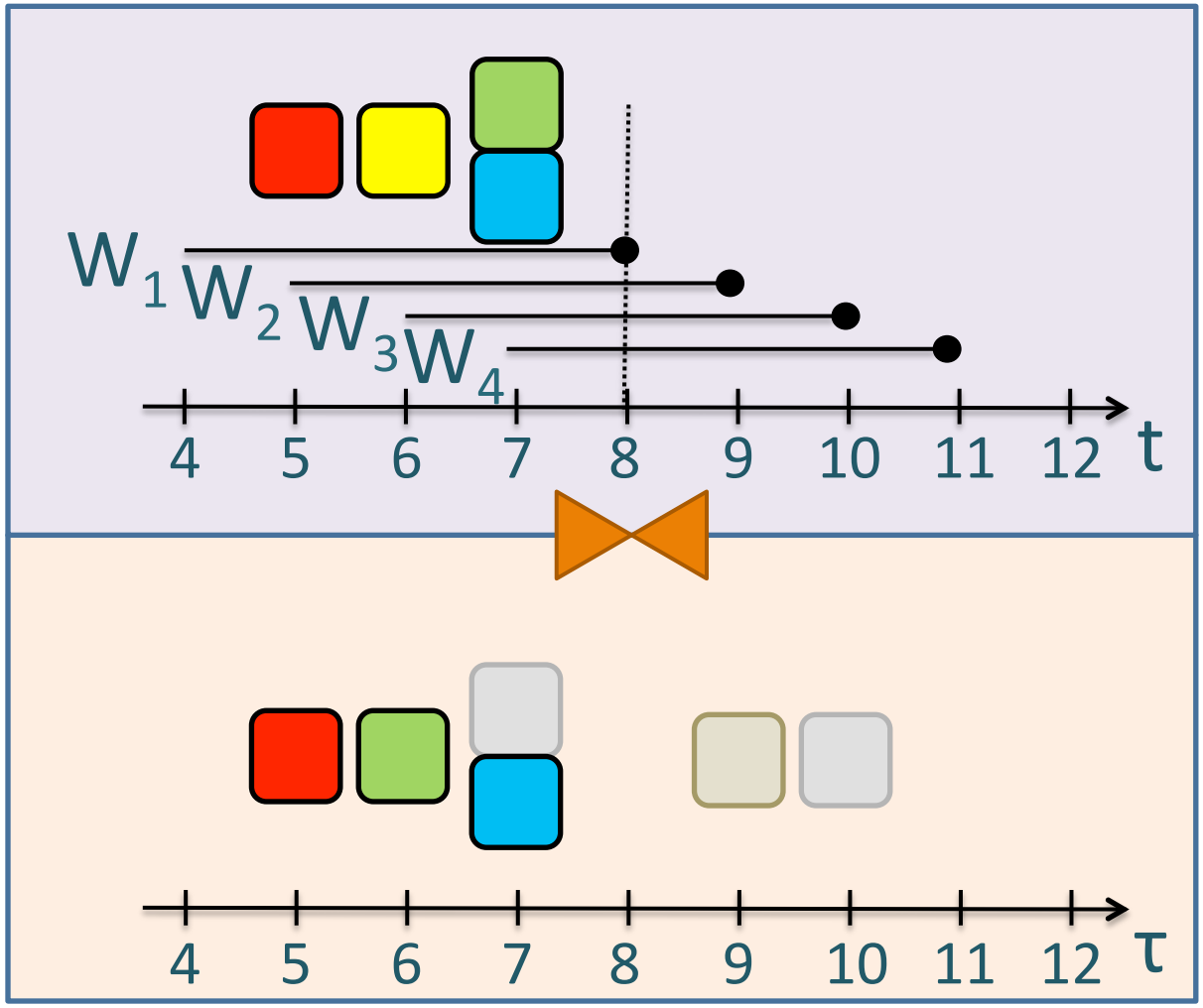


mappings

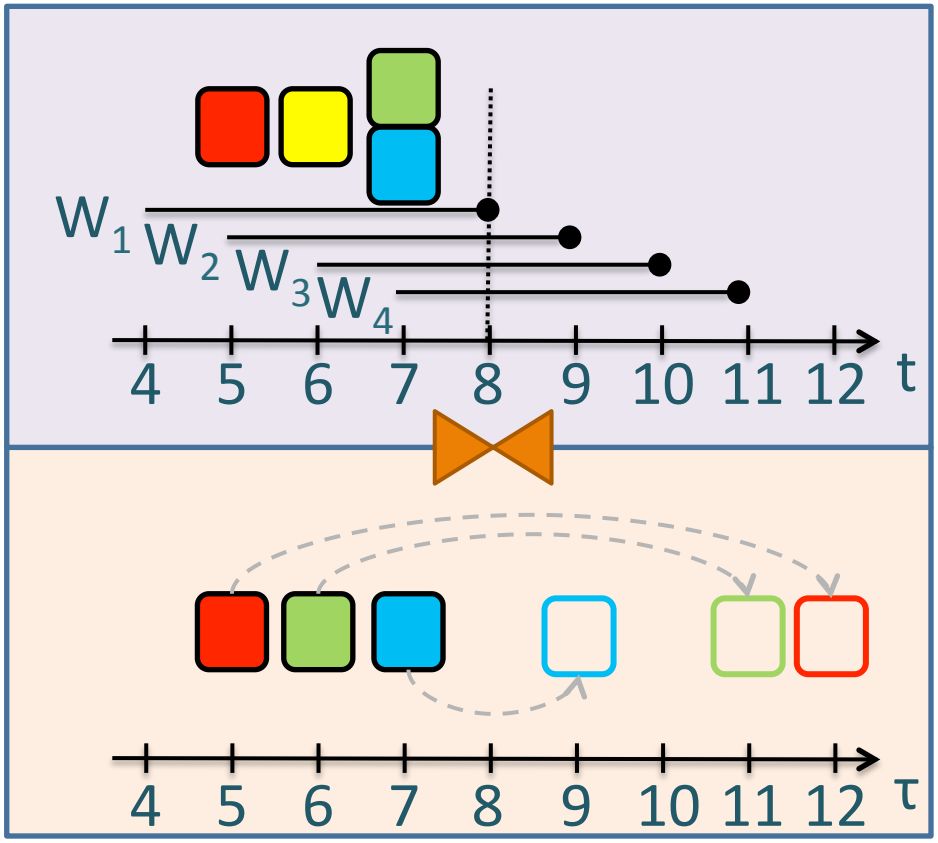
compatible mappings

Solution (1): WSJ

WSJ: Focus on the **stale mappings** involved in the **current** evaluation



Solution (2): WBM

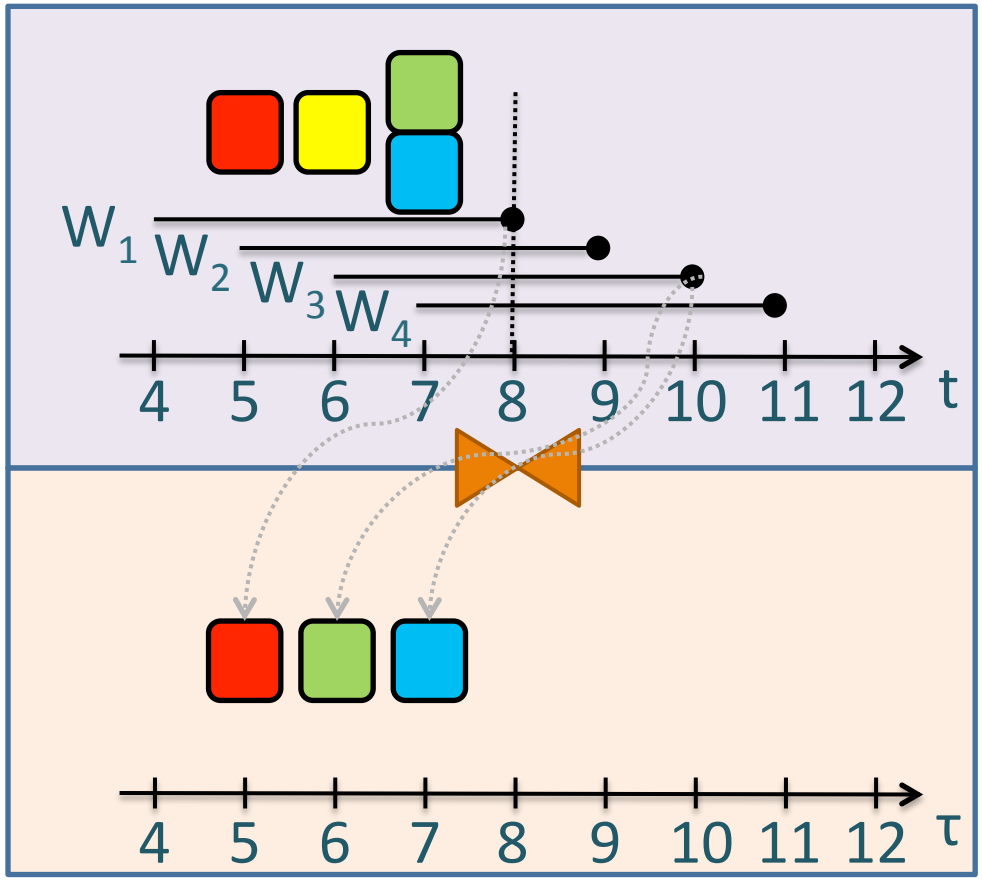


V: When would the mappings **became stale** if refreshed now?

	V	L	Score
	3		
	4		
	1		

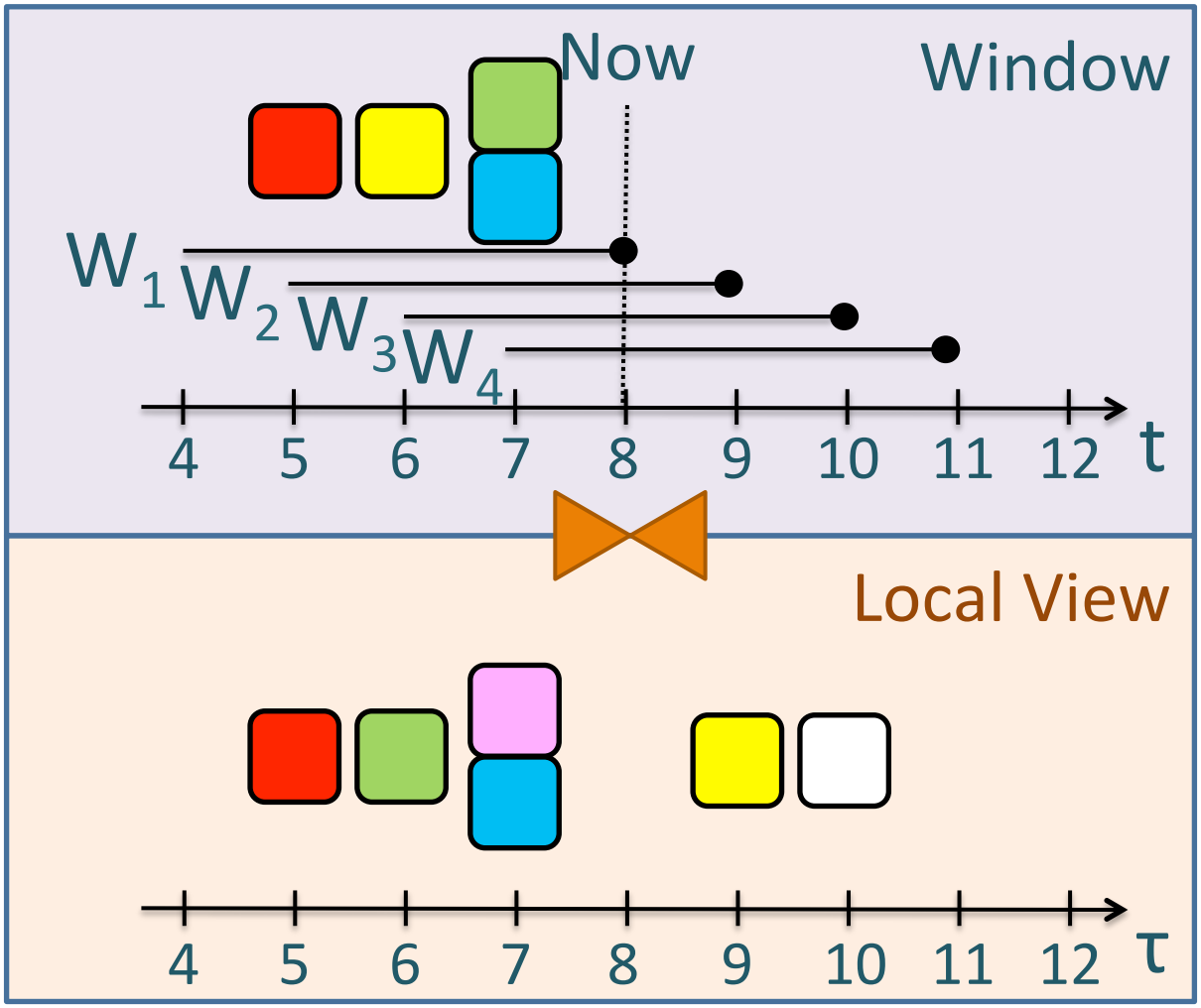
Solution (2): WBM

L: For how many **future evaluations** the mappings is involved?



	V	L	Score
	3	3	3
	4	1	1
	1	3	1

Solution (2): WBM



WBM **ranks** the mappings by using a score: Score=min(L,V)

	V	L	S
	3	3	3
	4	1	1
	1	3	1