Supplementary Material for the paper: "I-DLV-sr: A Stream Reasoning System based on I-DLV"

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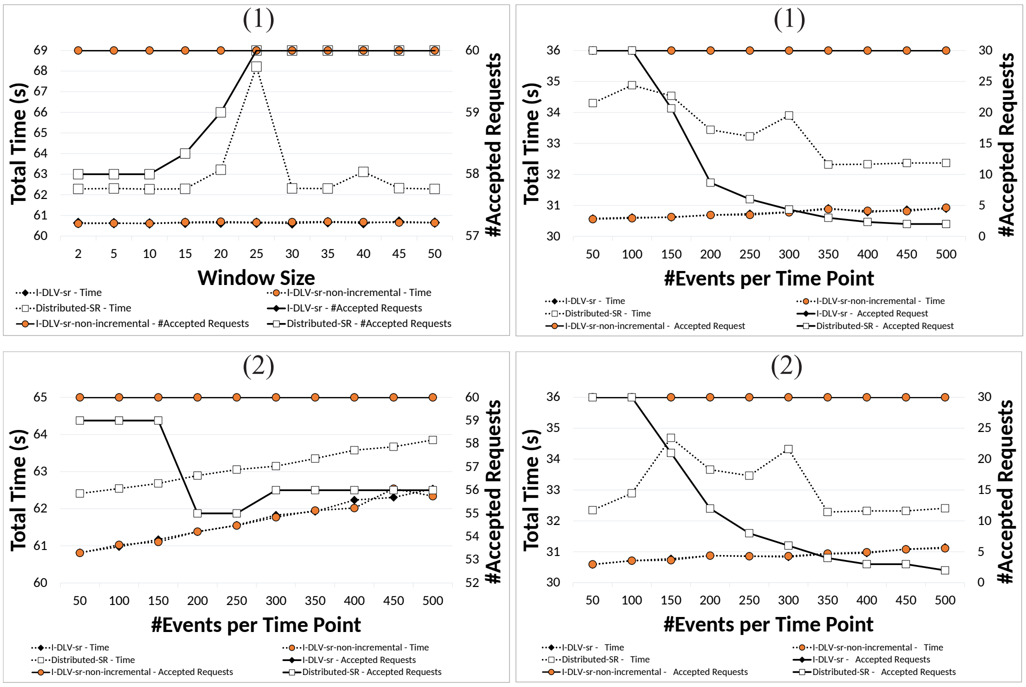
Proof of Proposition 1

We first recall that by definition of stratum application on Σ, $\Sigma_0 = \Sigma'_0 = \Sigma$ and that a trigger application adds ground (predicate) atoms only to the last set of a stream. For convenience, given a stream $\Sigma = \langle S_0, \ldots, S_n \rangle$, we denote the last set S_n as $last(\Sigma)$. We prove that if an atom a belongs to the last set of one of the two streams Σ_h or Σ'_t, then a necessarily belongs to the last set of the other stream. Hence, let us suppose that $a \in last(\Sigma_h)$, we prove that $a \in last(\Sigma'_t)$. In particular, we show that $\forall i \in \{0, \ldots, h\}, a \in last(\Sigma_i) \implies \exists j_a \in \{0, \ldots, t\} : a \in last(\Sigma'_{j_a})$. We proceed by induction:

- $a \in last(\Sigma_0)$. Since $\Sigma_0 = \Sigma'_0 = \Sigma$, we have that $j_a = 0$.
- We assume that $a \in last(\Sigma_n) \implies \exists j_a \in \{0, \ldots, t\} : a \in last(\Sigma'_{j_a})$.
- If $a \in last(\Sigma_{n+1})$ we can have that either $a \in last(\Sigma_n)$ and by inductive hypothesis there exists $j_a \in \{0, \ldots, t\} : a \in last(\Sigma'_{j_a})$ or Σ_{n+1} is the result of the application of the trigger $\langle r_n, \sigma_n \rangle$ on Σ_n, i.e. $\Sigma_n \langle r_n, \sigma_n \rangle \Sigma_{n+1}$, with $a = \sigma_n(l)$ where $l \in H(r_n)$. In the latter case, we have that $\Sigma_n \models \sigma_n(b) \forall b \in B(r_n)$. If $b \in B(r_n)$ is a non-harmless literal its truth value cannot depend on rules belonging to stratum Π_s. Then $\Sigma_n \models \sigma_n(b)$ iff $\Sigma \models \sigma_n(b)$. If $b \in B(r_n)$ is an harmless literal with predicate atom $p(t_1, \ldots, t_p)$ we can have that $\Sigma \models \sigma_n(b)$ or we can have that $\sigma_n(p(t_1, \ldots, t_p)) \in last(\Sigma_n)$. By inductive hypothesis we have that $\exists j_b \in \{0, \ldots, t\} : \sigma_n(p(t_1, \ldots, t_p)) \in \Sigma'_{j_b}$. Hence, there exists a stream Σ'_m, with $m \in \{0, \ldots, t-1\}$ such that $\Sigma'_m \models \sigma_n(b) \forall b \in B(r_n)$ and there exists $m < j_a \leq t$ such that $a \in \Sigma'_{j_a}$.

$\square$

Additional Experimental Results



(a) Content Caching *(b) Heavy Join*

Figure 1: Results on *Content Caching* and *Heavy Join* including also a version of *I-DLV-sr* relying on the non-incremental $\mathscr{I}$*-DLV* reasoner.