

# Tasks

## Task List

### Task SI

- **Denomination**
  - Structure and Induction of SASPs
- **Description and expected results:**
  - **Objectives:** Clarify the role of Stochastic Answer Set Programs (SASPs) structure and composition elements (eg stratified or recursive programs, functional symbols) in the stable models, our equivalence relation of events, and existing ASP and ILP systems; Proceed from already established (in existing research) scoring programs methods to SASPs using program space exploration algorithms based on program transformation rules (eg genetic algorithms).
  - **Methods:** Investigate SASP structures and composition elements, how they affect stable models, event classes, and respective probability; Investigate program transformation rules and program space exploration algorithms in the context of SASPs.
  - **Expected results:** Assessment on the effects of the studied structures and composition elements on stable models, event classes, and respective probability; Compilation and assessment of program transformation rules and space explorations algorithms for SASPs.
  - **Links to other tasks:**
    - Preconditions from other tasks: None - this is an initial task, a continuation of already done research;
    - Results for other tasks:
      - INT, HPC: This task gives important insights into algorithm design and implementation, for the computation of the event classes and respective probabilities, either in a sequential setting (INT task) or distributed (HPC task).
  - **Partners and Institution roles:**
    - Universidade de Évora, Principal contractor;
  - **Justification for the needed resources:** A member should present the results of this task in an international conference, requiring support for registration, travel, per diem.
- **Assigned team members:**
  - Francisco Coelho, Universidade de Évora;
  - Salvador Abreu, Universidade de Évora;

- Bruno Dinis, Universidade de Évora;

- **Person \* Month:**

Member	Percentage	Months	P*M
Francisco Coelho	16.7%	6	1.0
Salvador Abreu	16.7%	6	1.0
Bruno Dinis	16.7%	6	1.0
<b>Total</b>			3.0

- **Deliverables:**

- Two papers accepted in A\* or A international conferences or Q1 journals, by 2025-05-01.

- **Budget**

Item	Amount
Registration in international conference (x2)	1400.00€
Travel to international conference (x2)	1000.00€
Per diem international conference (x3x2)	1152.00€
Overheads (25%)	888.00€
<b>Total</b>	4440.00€

## Task INT

- **Denomination**

- Integration with existing ASP and ILP software frameworks

- **Description and expected results**

- **Objectives:** A library, and its documentation, to enable efficient SASP related computations: parsing, event classes and probabilities, induction.
- **Methods:** Implement, test, document and demonstrate a library to process SASP programs (parse the SASP language; utilize existing ASP frameworks to compute stable models; compute the event classes and respective probabilities; induce SASPs from data).
- **Expected results:** A library that implements the algorithms proposed in previous tasks and existing research, to be utilized in future applications and tasks, and associated documentation; A PhD graduation; Contributions to existing ASP frameworks, such as Potassco.

- **Links to other tasks:**
  - Preconditions from other tasks: None - this is an initial task, a continuation of already done research; However, results from task ISE will guide the implementation for induction of SASPs from data and background knowledge.
  - Results for other tasks:
    - HPC: A proposed library API, to guide the implementation in the HPC task.
    - APP, RWC: These applied tasks require adequate software support, ie the library and documentation delivered by this task.
- **Partners and Institution roles:**
  - Universidade de Évora, Principal contractor;
- **Justification for the needed resources:** The implementation volume and complexity requires a fulltime PhD student working over a year, using a suitable laptop; The PhD student should present the results of this task in an international conference, requiring support for registration, travel, per diem.
- **Assigned team members**
  - Francisco Coelho, Universidade de Évora;
  - BI Scholarship fellow, Universidade de Évora;
- **Person \* Month**

Member	Percentage	Months	P*M
Francisco Coelho	16.7%	12	2.0
BI Scholarship fellow	100.0%	12	12.0
<b>Total</b>			14.0

- **Deliverables**
  - Proposal for the library API, by 2024-12-01.
  - Report documenting the features and progress in the library implementation, by 2025-03-01.
  - Paper accepted in a A\* or A international conference or Q1 journal, by 2025-06-01.
  - Library, and the respective documentation, to parse SASP; interface with existing ASP frameworks; compute event classes and respective probabilities, by 2025-06-01.
  - Completed PhD thesis, by 2025-09-01.
- **Budget**

Item	Amount
Laptop Computer (i7; 32GB RAM; 1TB SSD; 15")	2658.21€
Registration in international conference	700.00€

Item	Amount
Travel to international conference	1000.00€
Per diem international conference (x3)	576.00€
BI Scholarship (12 months, 1144.64€/month)	13735.68€
Overheads (25%)	4667.47€
<b>Total</b>	<b>23337.36€</b>

## Task HPC

- **Denomination**
  - High Performance Computing for Induction and Use of SASPs
- **Description and expected results**
  - **Objectives:** Use High Performance Computing systems to speedup and scale-up applications of SASPs.
  - **Methods:** Benchmark the benefits of data and process distribution for SASPs on High Performance Computing systems.
  - **Expected results:** Compilation and assessment of distributed SASPs on HPC systems; A library that implements distributed versions of some API functions described in the INT task, to be utilized in future applications and tasks, and associated documentation;
  - **Links to other tasks:**
    - Preconditions from other tasks:
      - INT: The proposed library API is utilized to guide this task implementation, in order to strive for compatibility.
      - ISE: Results from task ISE will guide the implementation for induction of SASPs from data and background knowledge.
    - Results for other tasks:
      - APP, RWC: These applied tasks require adequate software support, ie the library and documentation delivered by this task.
  - **Partners and Institution roles:**
    - Universidade de Évora, Principal contractor;
    - High Performance Computing Chair, Research Unit; Collaborative institution;
  - **Justification for the needed resources:**
    - A member should present the results of this task in an international conference, requiring support for registration, travel, per diem.
    - Adaptation of sequential programs to HPC systems requires expert consultation.

- An HPC system is required to this task.

- **Assigned team members**

- Francisco Coelho, Universidade de Évora
- Miguel Avillez, High Performance Computing Chair (as Consultant)

- **Person \* Month**

Member	Percentage	Months	P*M
Francisco Coelho	16.7%	12	2.0
Miguel Avillez	16.7%	12	2.0
<b>Total</b>			4.0

- **Deliverables**

- Report on the performance of the distributed versions of the programs to interface with existing ASP frameworks and compute event classes and respective probabilities, by 2025-09-01.
- Paper accepted in a A\* or A international conference or Q1 journal, by 2026-03-01.

- **Budget**

Item	Amount
Registration in international conference	700.00€
Travel to international conference	1000.00€
Per diem international conference (x3)	576.00€
HPC system	1000.00€
Overheads (25%)	819.00€
<b>Total</b>	4095.00€

## Task APP

- **Denomination**

- Applications of SASPs

- **Description and expected results**

- **Objectives:** Apply SASP, and SASP induction, to some theoretic scenarios (toy problems) described in the relevant literature (eg Stochastic Plan Generation, Logic/Statistic Puzzles) as well as to some real world cases (eg [TODO]).

- **Methods:** Compile a set of theoretic and real-world problems; Gather information in the form of background knowledge (eg from experts) and data (positive and negative examples) about selected problems; Evaluate hand-coded and induced SASPs on that set; Compare with state-of-the-art results.
  - **Expected results:** Assessment of the performance of hard-coded and induced SASPs with respect to state-of-the-art systems; List of advantages and problems.
  - **Links to other tasks:**
    - Preconditions from other tasks: Libraries, and respective documentation, from tasks IFS and HPC.
    - Results for other tasks: None - This is a final task.
  - **Partners and Institution roles:**
    - Universidade de Évora, Principal contractor;
  - **Justification for the needed resources:**
    - A member should present the results of this task in an international conference, requiring support for registration, travel, per diem.
    - An HPC system is required to this task.
- **Assigned team members**
    - Francisco Coelho, Universidade de Évora
    - Salvador Abreu, Universidade de Évora
    - Miguel Avillez, High Performance Computing Chair

- **Person \* Month**

Member	Percentage	Months	P*M
Francisco Coelho	16.7%	6	1.0
Salvador Abreu	16.7%	6	1.0
Miguel Avillez	16.7%	6	1.0
<b>Total</b>			<b>3.0</b>

- **Deliverables**

- A paper accepted in a A\* or A international conference or Q1 journal, by 2026-03-01.

- **Budget**

Item	Amount
Registration in international conference	700.00€
Travel to international conference	1000.00€

Item	Amount
Per diem international conference (x3)	576.00€
HPC system	500.00€
Overheads (25%)	694.00€
<b>Total</b>	<b>3470.00€</b>

## Project Timeline

