ArchHypo Tooling: Enabling Practical Hypothesis Engineering for SA

Author: Pedro Henrique Mariano Corrêa

Advisor: José Gonçalves Lima Neto | Co-advisor: Paulo Meirelles

Introduction

Software Architecture (SA) is the structural foundation essential for system sustainability and long-term viability. In modern, fast-paced environments, SA must be a dynamic, continuous process, moving beyond static blueprints. The core challenge is balancing development speed with quality to ensure sustainable and adaptable architectures.

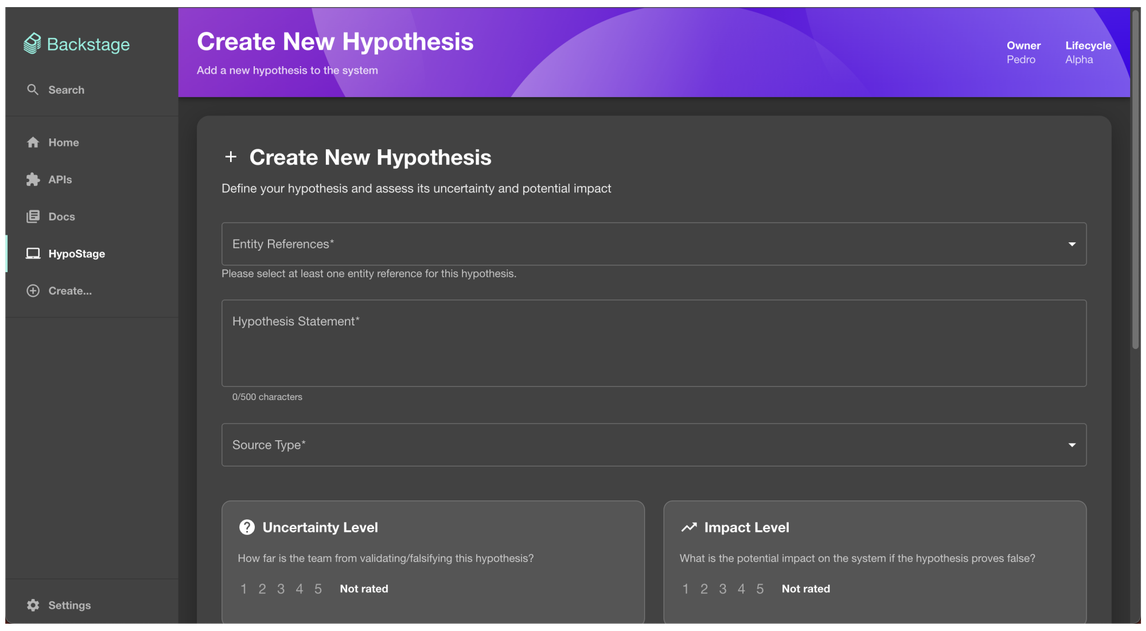
HypoStage: Tool Overview

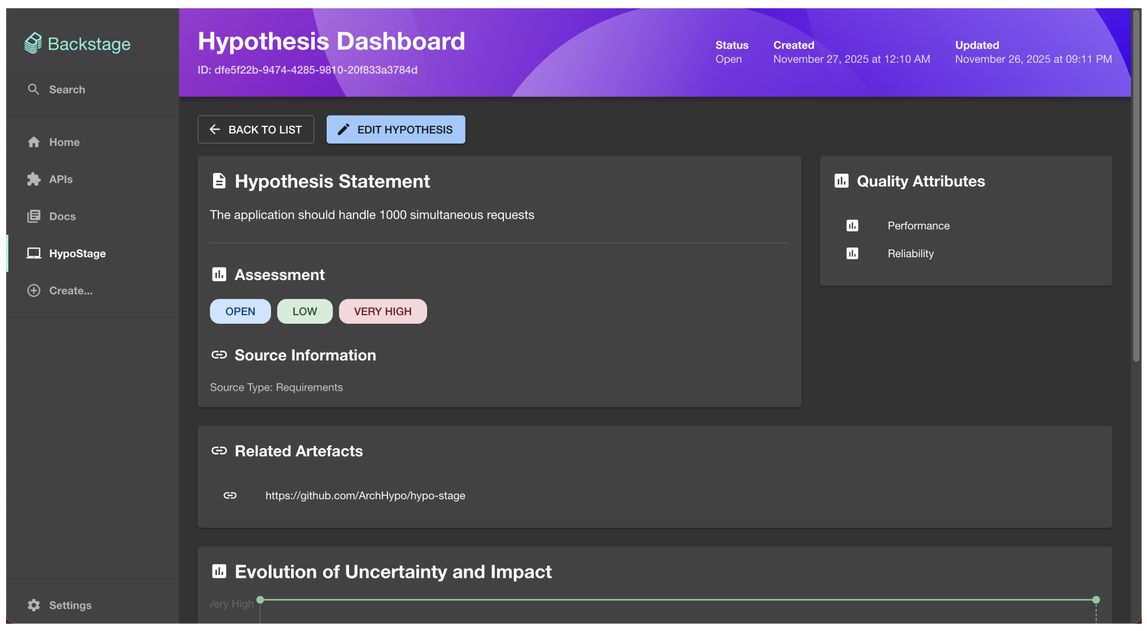
The **HypoStage** is a tool designed to help software teams manage architectural decisions more effectively in real-world projects. Built as a plugin for Backstage, it makes it easier for developers to document, assess, and track architectural hypotheses using structured guidance. It simplifies the process and reduces dependencies on experts.

The ArchHypo Framework

- **Hypothesis Engineering**: Uses hypotheses to manage and document architectural uncertainties.
- **Uncertainty vs. Risk**: Focuses on unknowns, not just measurable risks.
- **Sources**: Uncertainties arise from requirements or technical solutions.
- **Assessment**: Hypotheses are rated by uncertainty level and impact.
  - Uncertainty Level: How far the team is from proving the hypothesis true or false.
  - Impact: The effort/consequence required to transition to a different alternative.
- **Technical Plan**: Plans aim to reduce key uncertainties or impacts.

HypoStage: the ArchHypo tooling





HypoStage Functionalities

- **Hypothesis Management**: Create, edit, and track hypothesis lifecycle.
- **Uncertainty Assessment**: Evaluate Impact and Uncertainty using structured 1–5 Likert scale.
- **Technical Planning**: Define and track technical action planslinked to hypotheses.
- **Quality Tracking**: Associate hypotheses with Quality Attributes.
- **Visualization & Evidence**: Track evolution via interactive charts and link to supporting documentation.

More information: https://github.com/ArchHypo/hypo-stage