Tyler Baylson
Andrew Sexton

Capstone Advisor:
Dr. Katanosh Morovat

Natural Language Processing for Policy Based Access Control
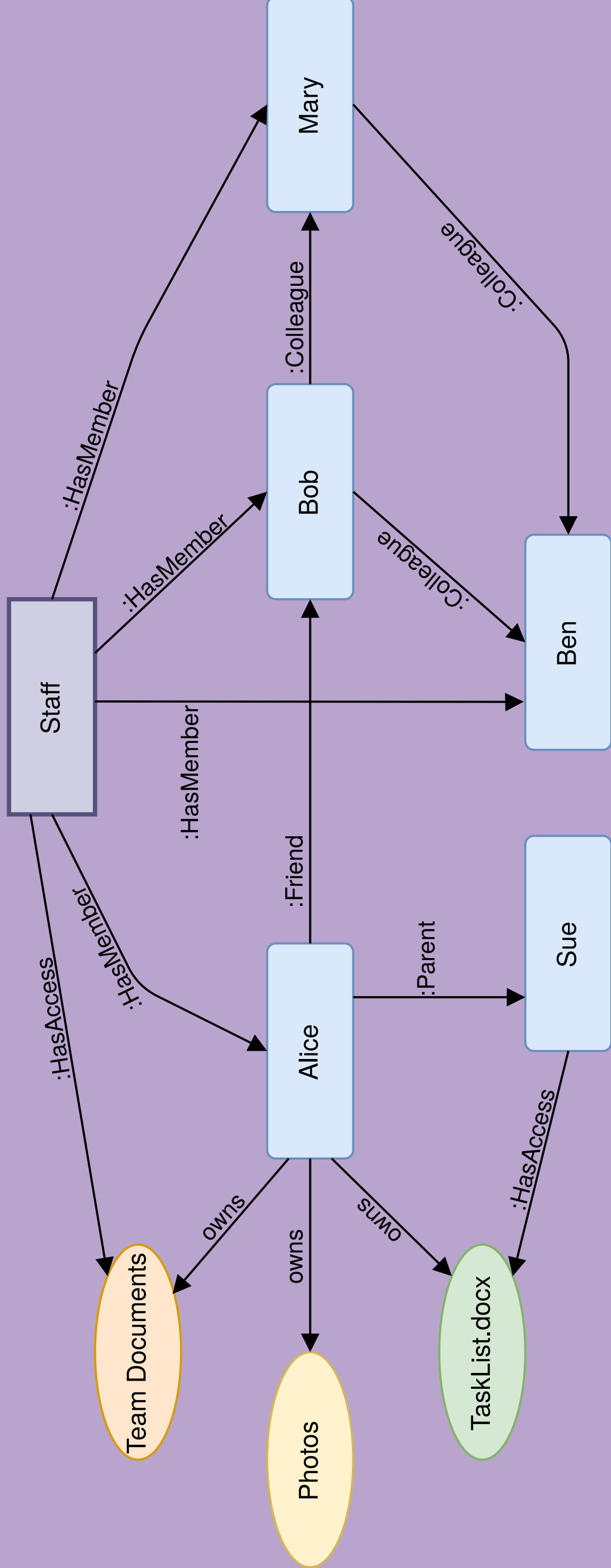
Western Carolina

Data Basics

Filesystems can be scaled for a userbase from one to thousands of users.

Efficiency of work is often greatly increased by having users access the same files within these systems.
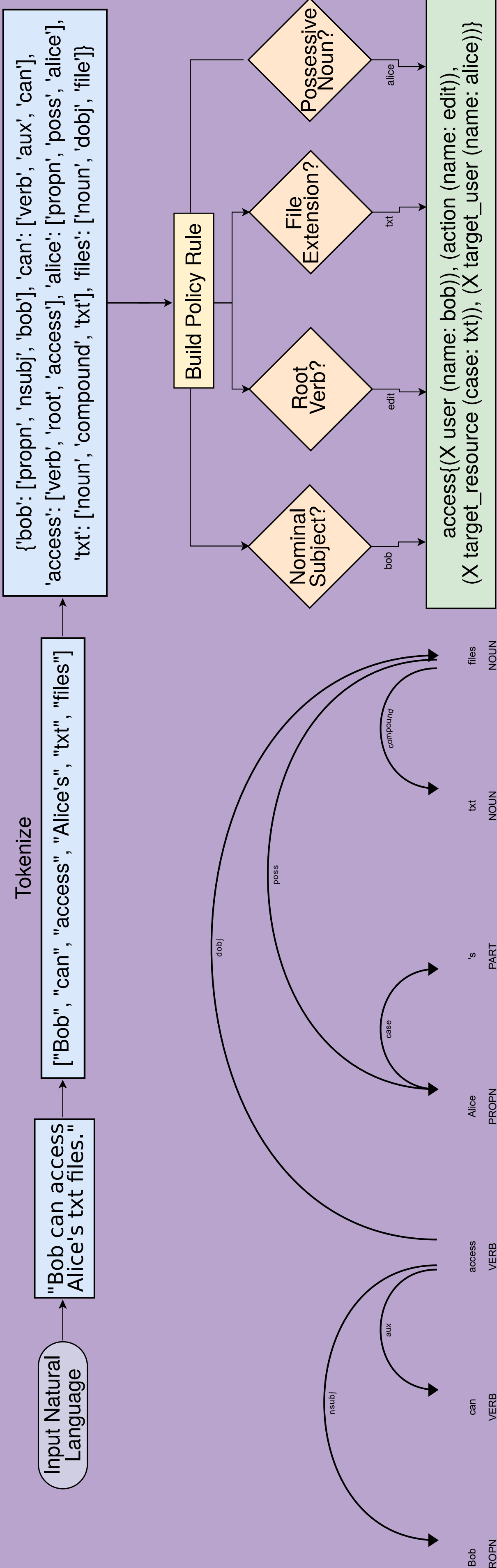
Problem

While typical access in these systems is legitimate, if security requirements relax, the whole company can be left at risk.

Easy and effective means to protect information and resources must be made available to those responsible for its security.

Approach

Our solution stands as a faithful implementation of Dr. Morovat's own Policy Based Language for Access Control, implementing a "well-formed notation" for specifying access control policies and access authorization requests.

Natural language is the most direct way to input a command, and our program allows for natural input that may perform two tasks:

1. Implement policies to build secure access
2. Receive inquiries to grant or deny access

This system is able to handle everything from simple "user can access filename" statements to fully customized schedules of access based on filetype and environmental time.

User Experience

Our UI is simple, but flexible, allowing it to be presented within an intranet-based web-application or localized desktop application as companies may wish to have more granular control over its presentation.

python

spaCy

Input Natural Language → "Bob can access Alice's txt files."

Tokenize
["Bob", "can", "access", "Alice's", "txt", "files"]

Determine Parts of Speech
{'bob': ['propn', 'nsubj', 'bob'], 'can': ['verb', 'aux', 'can'],
'access': ['verb', 'root', 'access'], 'alice': ['propn', 'poss', 'alice'],
'txt': ['noun', 'compound', 'txt'], 'files': ['noun', 'dobj', 'file']}

Build Policy Rule

- Nominal Subject? → bob
- Root Verb? → edit
- File Extension? → txt
- Possessive Noun? → alice

access([(X user (name: bob)), (action (name: edit)),
(X target_resource (case: txt)), (X target_user (name: alice))])

Bob — can — access — Alice — 's — txt — files
PROPN — VERB — VERB — PROPN — PART — NOUN — NOUN

nsubj — aux — case — poss — compound — dobj