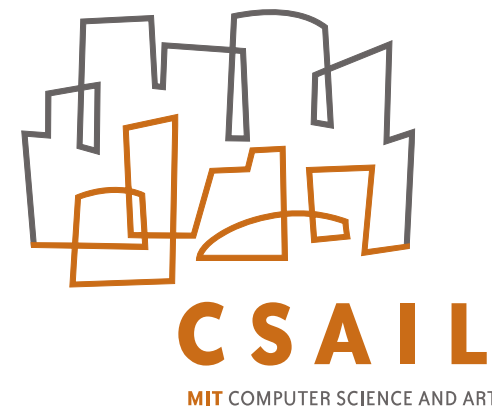


# Understanding Git with Alloy

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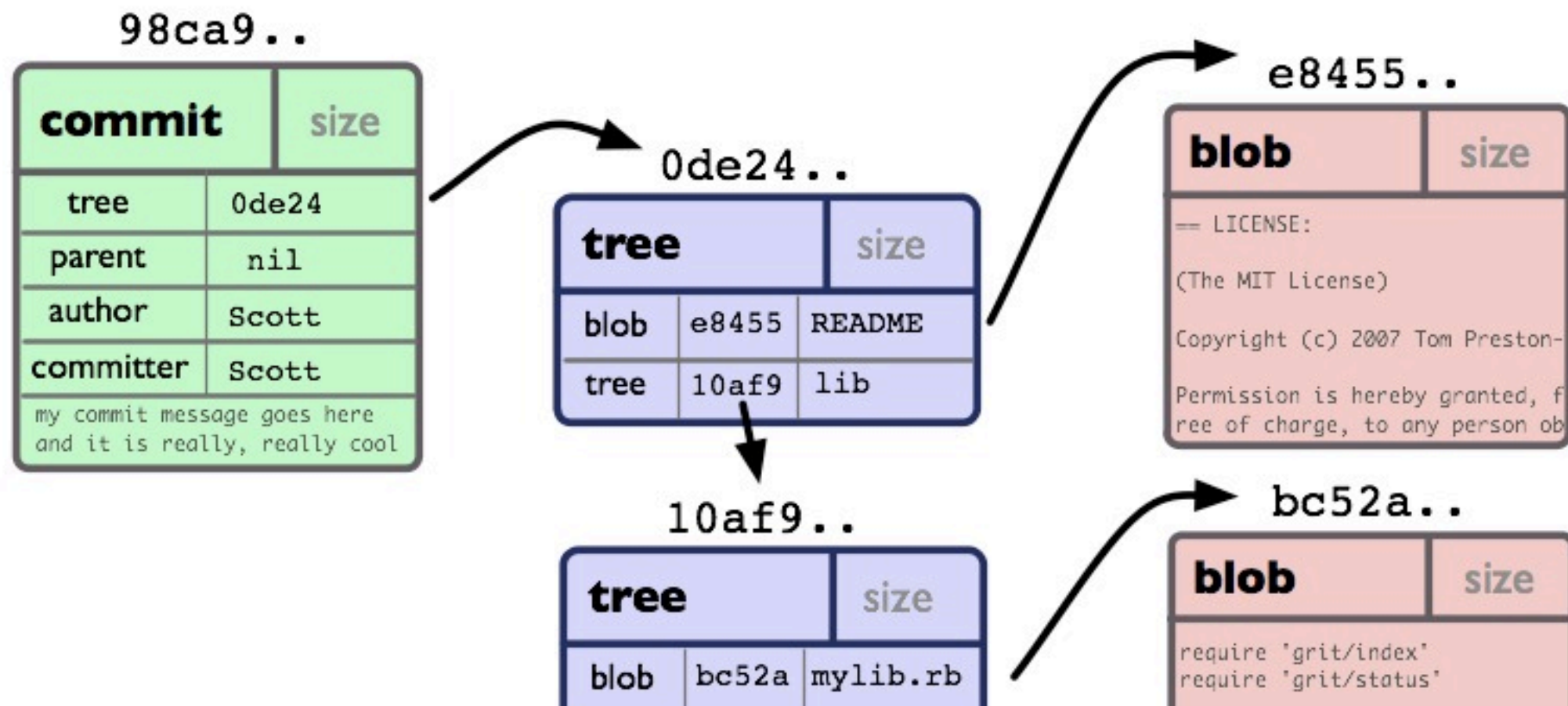
# Git

Popular version control system (VCS)

- GitHub: Over 2.4 million repositories

Fast & powerful, but complex

- Different from traditional model (SVN, CVS, etc.,)



# Goals

Build a precise model of how Git work

Analyze the model

- What properties does it (not) guarantee?
- Commutativity, idempotence, consistency, etc.,

Compare to other systems

- How is Git different?
- Mercurial, Perforce, SVN, CVS, etc.,

Build a concise user manual based on the model

# Alloy

## A modeling language

- Based on first-order relational logic
- Lightweight & flexible

## Automated analysis

- By translation to SAT
- Scenario generation & property checking
- Used in protocol analysis, program analysis, security, configuration, test case generation, etc.,

# Benefits

Demonstrate Git satisfies important properties

- Or find bugs that disprove them (big deal!)

First known precise understanding of VCS

- Helpful to millions of programmers
- e.g. “When/why should you use Git over Mercurial?”

Fun & challenging project

- Learn about formal methods & distributed systems
- Publication opportunities