

# CS 1622: Midterm Review

Jonathan Misurda  
jmisurda@cs.pitt.edu

## Introduction

---

- What is a Compiler?
- Compilers vs. Interpreters
- Phases of Compilation
  - Input
  - Output
  - Purpose
- Passes vs Phases
- Data Structures
  - AST
  - Symbol Table

## Lexical Analysis

---

- What is it?
- What is a token?
- What is a language?
- Regular Expressions
  - Concatenation
  - Alternation
  - Repetition

## Lexical Analysis

---

- Implementation
- Finite Automata
  - DFA
  - NFA
  - Graphical and table representations
- RE to NFA Conversion
- NFA to DFA Conversion
- Ambiguity resolution
- JFlex

## Syntax Analysis

---

- What is it?
- Insufficiency of Regular Expressions
- Grammars
- Derivation
- Chomsky Hierarchy of Languages
  - Type 0 — recursive grammar
  - Type 1 — context sensitive grammar
  - Type 2 — context free grammar
  - Type 3 — regular grammar

## Syntax Analysis

---

- Why CFLs for parsing?
- Parse trees
- Ambiguity and its resolution
- Top Down Parsing
  - Backtracking
  - Recursive descent
  - Predictive Parsing
  - LL(k) Grammars and Parsing
    - First and Follow Set
    - LL(1) Parse Table
    - LL(1) Parsing Algorithm

## Syntax Analysis

---

- Limitations of LL(k) Grammars
- Bottom Up Parsing
  - Shift Reduce Parsing
  - Handles and viable prefixes
  - Conflicts
    - Shift/Reduce
    - Reduce/Reduce
  - LR Grammars and Parsing
    - LR(0)
      - Items
      - DFA
      - Parse Table
    - SLR
      - Parse Table

## Syntax Analysis

---

- LR(1) Issues
- LALR Basic Idea
- JavaCUP
  - Semantic Actions
  - Conflicts
  - Conflict Resolution