

Lecture 13 - June 24

Syntactic Analysis, Design Patterns

Project Specification

CFG Derivations: LMD vs. Parse Trees

Static Types, Polymorphic Assignments

Thurs,
5:30 PM - 6:50 PM

Announcements/Reminders

- **Assignment 2, Project** released
- **ProgTest** next Thursday, July 3
 - + **Guide** and **practice test** released on Friday, June 27
 - + **Mockup ProgTest** \approx **5 PM** on Monday, June 30
 - + **Makeup lecture** right after the test (\approx 7:15)

in-person

in-person
options

Visualization Derivations from CFG

given a C.F.G., can an input string be produced?

- $A \xrightarrow{1} 0A1$
- $A \xrightarrow{2} \underline{B}$
- $B \xrightarrow{3} \#$

- Shortest Derivation?
- 000#111?
- 010#101?

(left-most derivation)

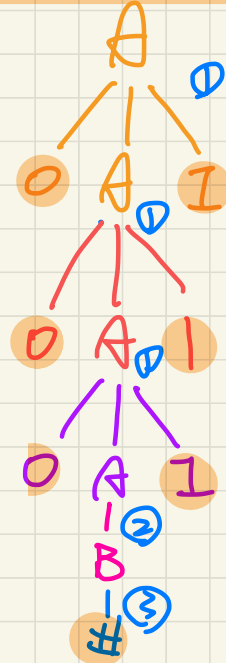
$\Rightarrow 0A1$ → not complete
there's at least one var.

$\Rightarrow 00A11$

$\Rightarrow 000A111$

$\xrightarrow{2} 000B111$

$\xrightarrow{3} 000\#111$

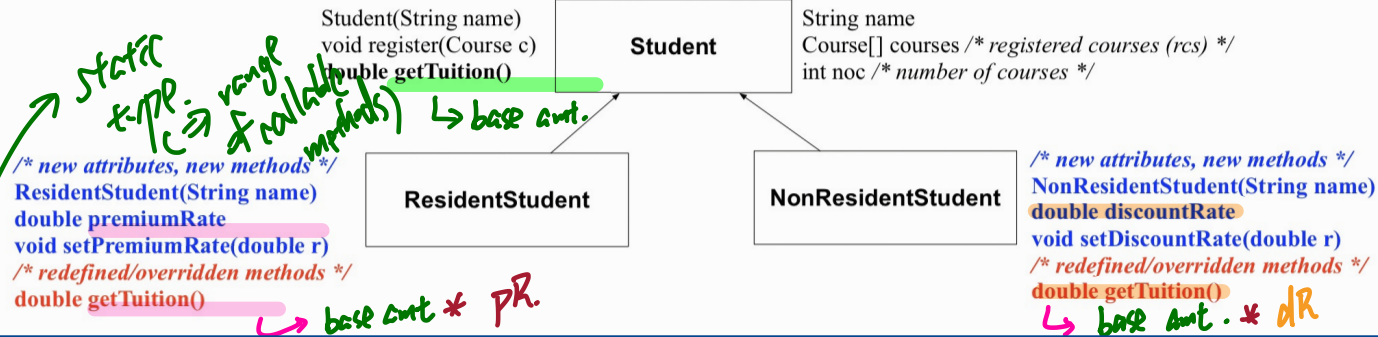


leaves in a parse tree form the input string derived.

Motivation Problem: Recursive Systems



Recall: Student Classes (with inheritance): Expectations



```

Student s = new Student("Stella");
ResidentStudent rs = new ResidentStudent("Rachael");
NonResidentStudent nrs = new NonResidentStudent("Nancy");
  
```

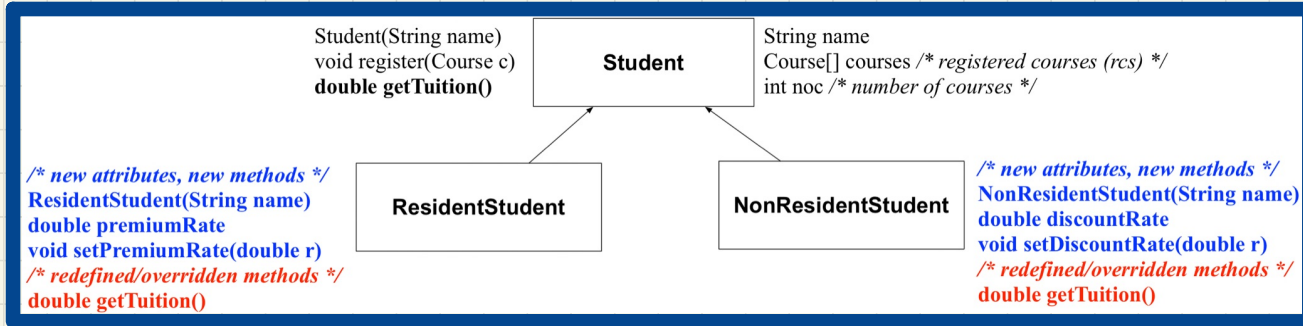
	name	rcs	noc	reg	getT	pr	setPR	dr	setDR
S.									
rs.									
nrs.									

not compiling

Intuition: Polymorphism

$$\frac{\text{var } 1}{\text{ST: } T_1} = \frac{\text{var } 2}{\text{ST: } (T_2)}$$

T_2 should be a subclass of T_1 ↓
 descendant class.



④ Assumption not valid
 ↳ LT should not compile.

```

1 Student s = new Student("Stella");
2 ResidentStudent rs = new ResidentStudent("Rachael");
3 rs.setPremiumRate(1.25);
4 s = rs; /* Is this valid? */
5 rs = s; /* Is this valid? */
    
```

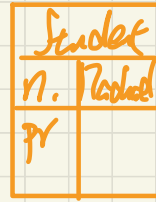
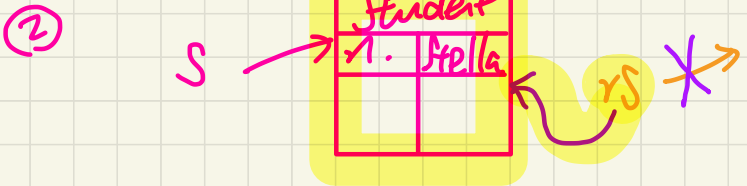
① Assume $rs = s$ compiles

③ Given rs decl. with ST RS

↳ $rs.pr$

Expanding $rs = s$

↳ expected crash 'ST Student not supporting it'



Third Design Attempt

