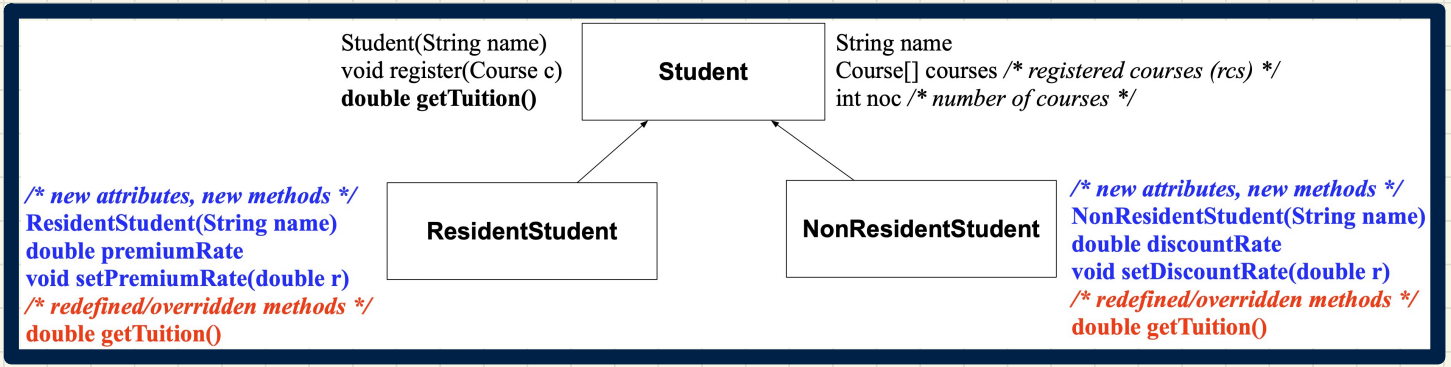
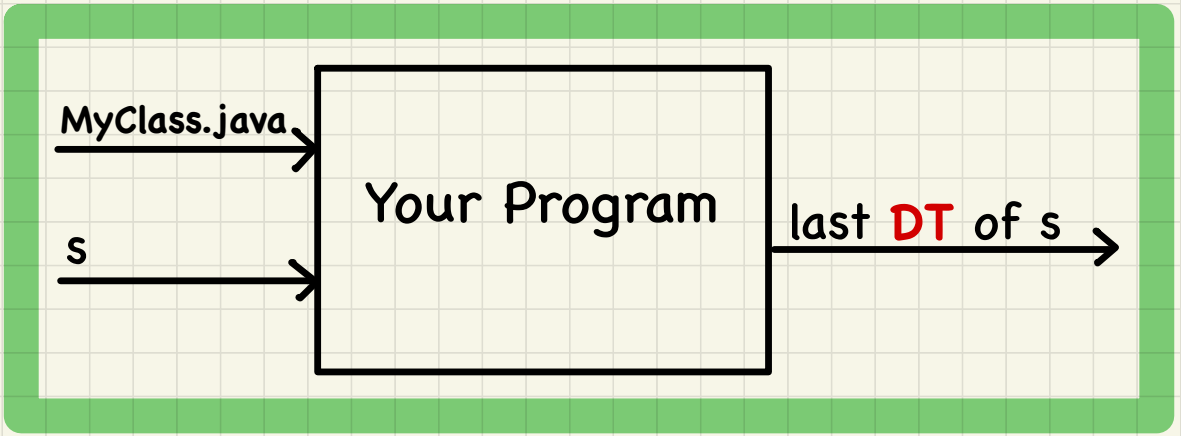
Type Cast: Motivation




```
1  Student jim = new ResidentStudent("J. Davis");
2  ResidentStudent rs = jim;
3  rs.setPremiumRate(1.5);
```

An A+ Challenge: Inferring the DT of a Variable




```
class MyClass {
   main (...)
      Student s = ...;
      ...
      s = new ResidentStudent(...);
   }
}
```

Anatomy of a Type Cast

Student jim = **new ResidentStudent**("Jim");

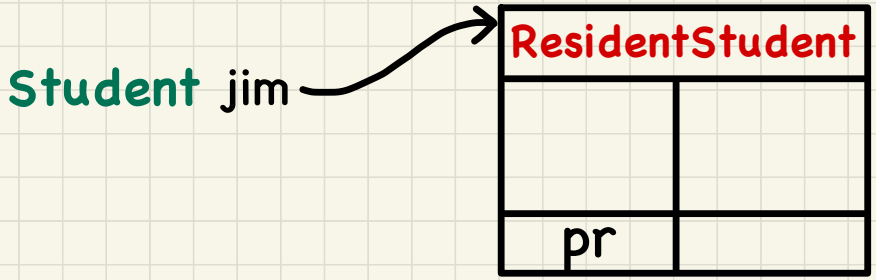
ST: *ResidentStudent*

ResidentStudent rs = (*ResidentStudent*) *jim*;

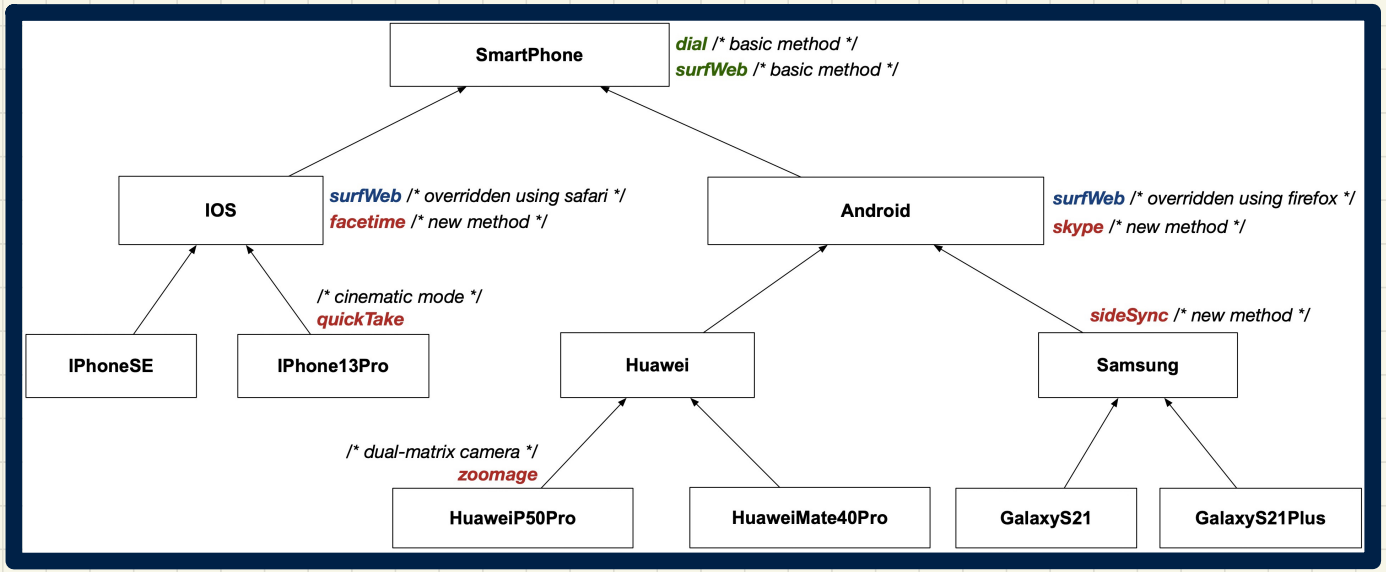
valid substitution

ST: Student

an alias whose ST is *ResidentStudent*



Type Cast: Named vs. Anonymous



Named Cast: Use intermediate variable to store the cast result.

```
SmartPhone aPhone = new IPhone13Pro();
IOS forHeeyeon = (IPhone13Pro) aPhone;
forHeeyeon.facetime();
```

Anonymous Cast: Use the cast result directly.

```
SmartPhone aPhone = new IPhone13Pro();
((IPhone13Pro) aPhone).facetime();
```

Exercise

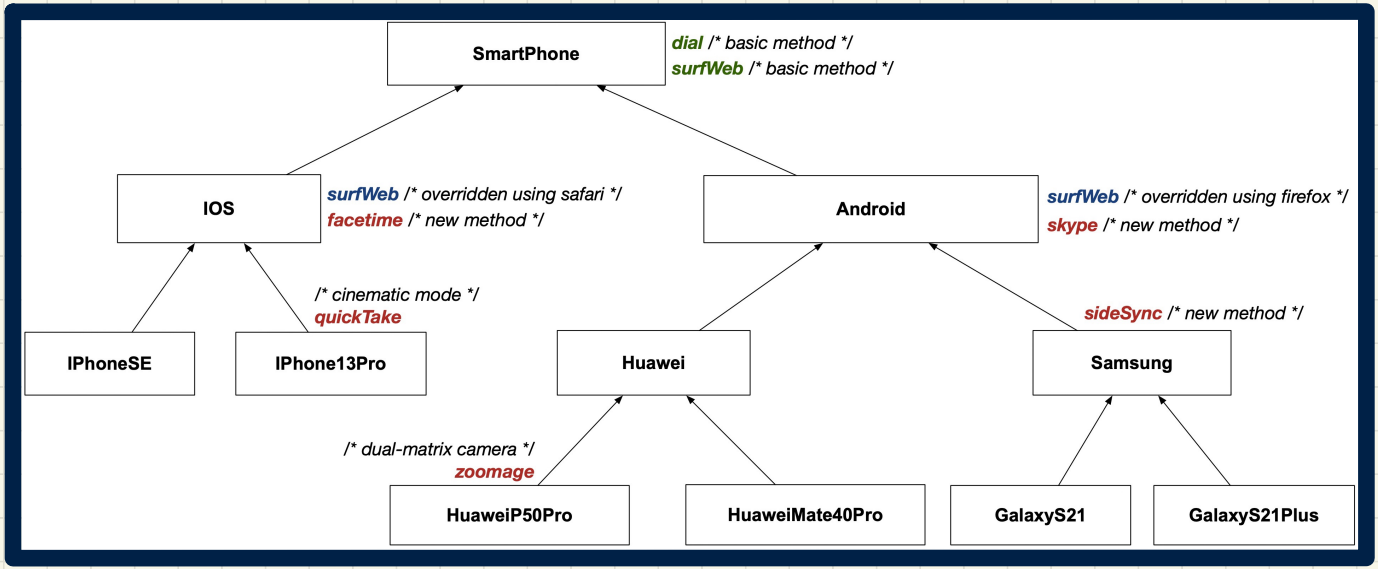
```
SmartPhone aPhone = new IPhone13Pro();
(IPhone13Pro) aPhone.facetime();
```

Compilable Casts: Upwards vs. Downwards

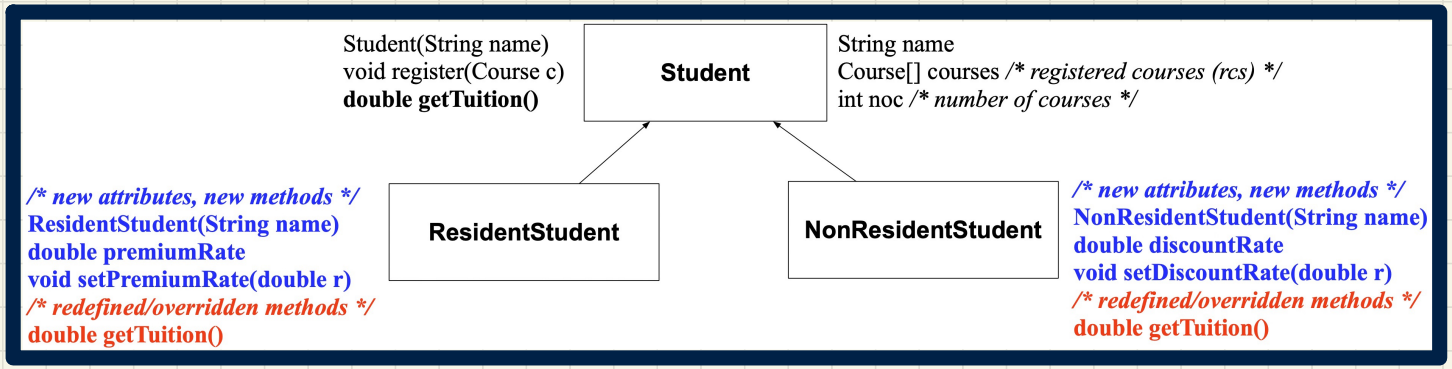
```
Android myPhone = new GalaxyS21Plus();

SmartPhone sp = (SmartPhone) myPhone;

GalaxyS21Plus ga = (GalaxyS21Plus) myPhone;
```

Expectations

	sp	myPhone	ga
dial			
surfWeb			
skype			
sideSync			
facetime			
quickTake			
zoomage			

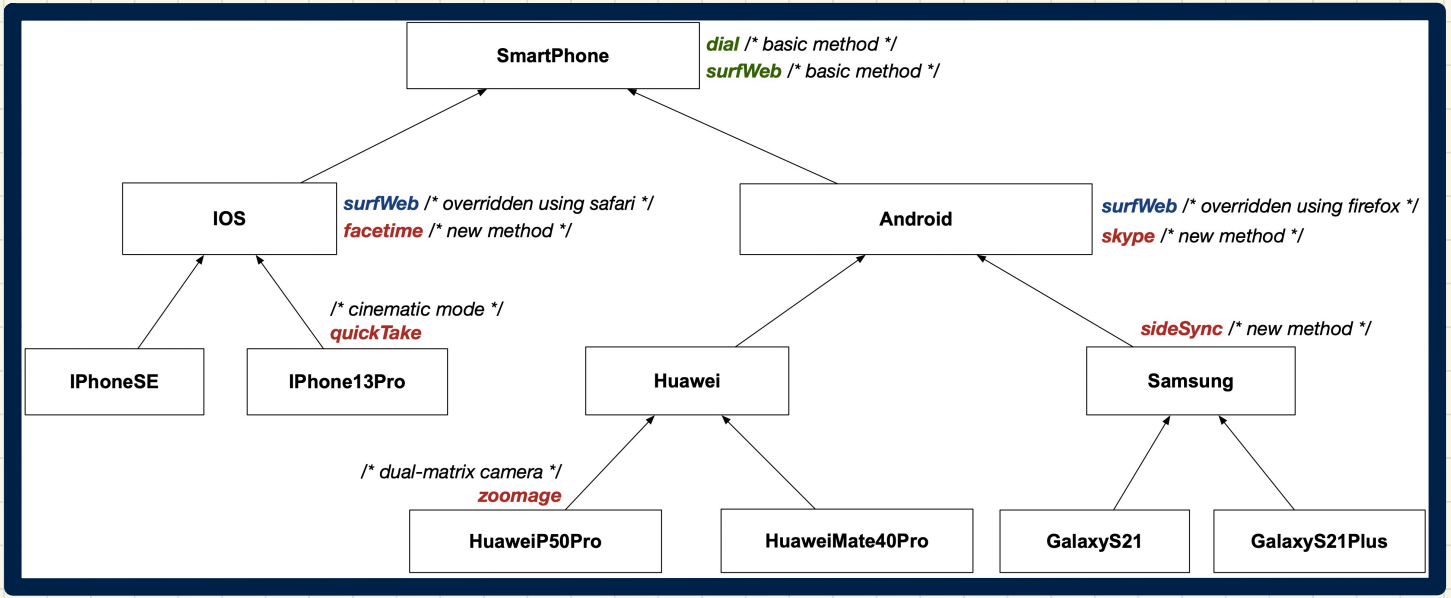


Compilable Type Cast May Fail at Runtime (1)



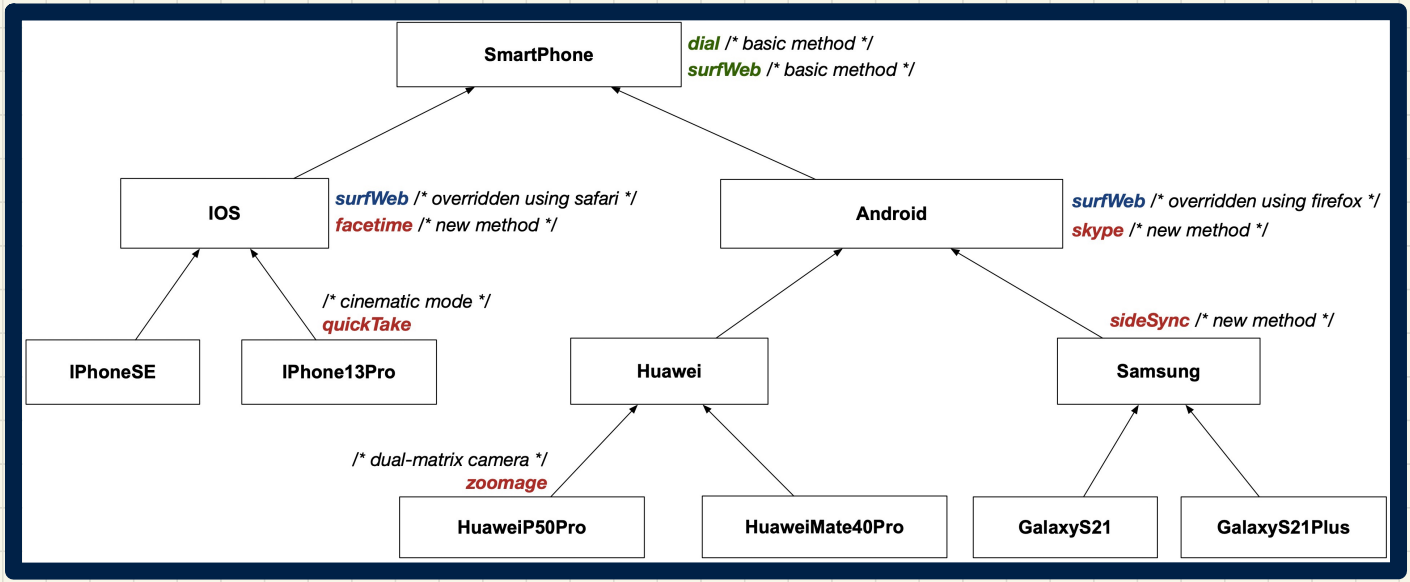

```
1  Student jim = new NonResidentStudent("J. Davis");
2  ResidentStudent rs = (ResidentStudent) jim;
3  rs.setPremiumRate(1.5);
```

Compilable Type Cast May Fail at Runtime (2)




```
1  SmartPhone aPhone = new GalaxyS21Plus();
2  IPhone13Pro forHeeyeon = (IPhone13Pro) aPhone;
3  forHeeyeon.quickTake();
```

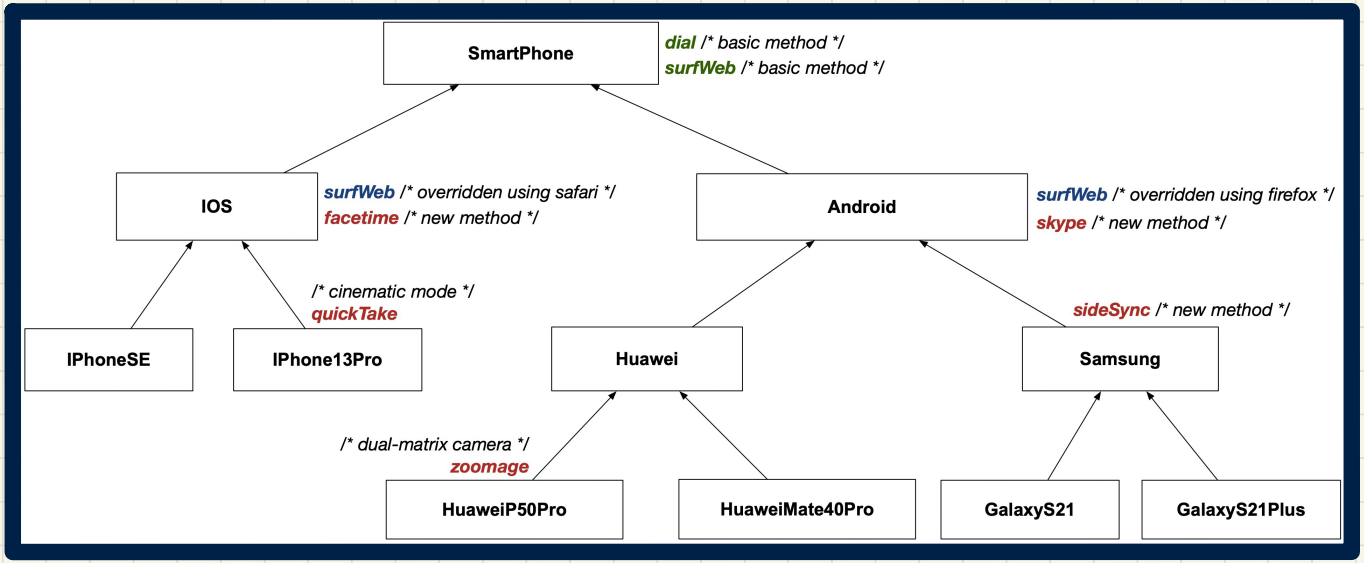
Exercise: Compilable Type Cast? Fail at Runtime? (1)




```
SmartPhone myPhone = new Samsung();
/* ST of myPhone is SmartPhone; DT of myPhone is Samsung */
GalaxyS21Plus ga = (GalaxyS21Plus) myPhone;
```

Compilable? ClassCastException at runtime?

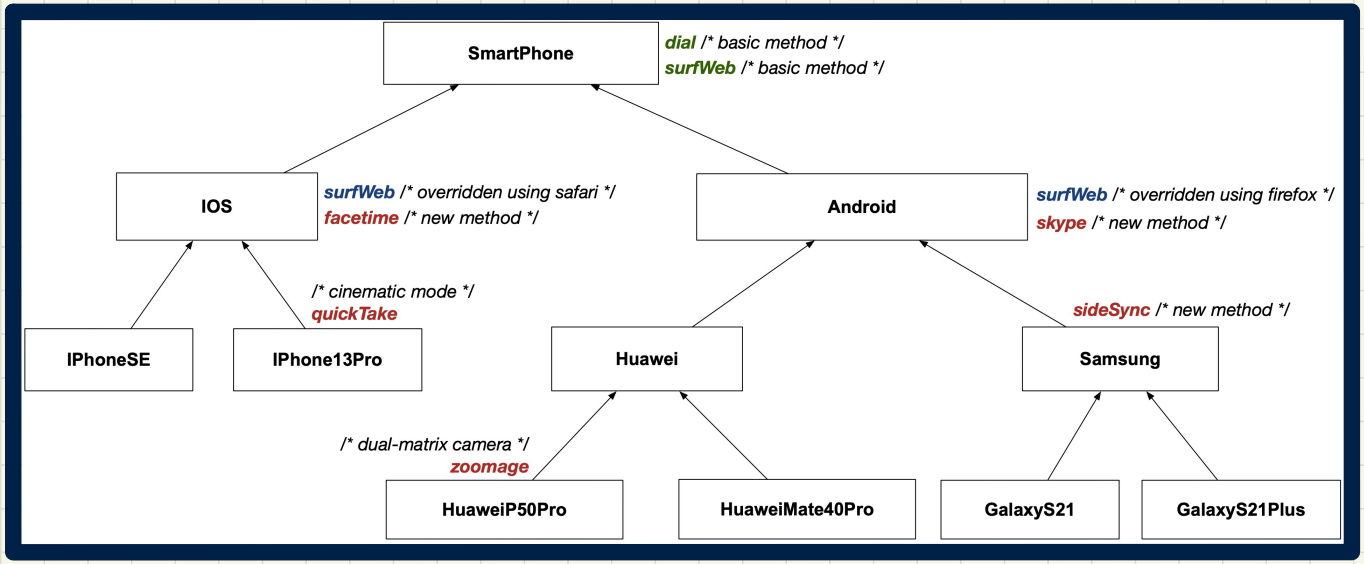
Exercise: Compilable Type Cast? Fail at Runtime? (2)




```
SmartPhone myPhone = new Samsung();
/* ST of myPhone is SmartPhone; DT of myPhone is Samsung */
IPhone13Pro ip = (IPhone13Pro) myPhone;
```

Compilable? ClassCastException at runtime?

Compilable Cast vs. Exception-Free Cast




```
Android myPhone = new Samsung();
```

Compilable Casts

Exception-Free Casts

Non-Compilable Casts

ClassCastException

Exercise: Compilable Cast vs. Exception-Free Cast

```
class A { }
class B extends A { }
class C extends B { }
class D extends A { }
```

```
1  B b = new C();
2  D d = (D) b;
```