Inheritance

- A reference variable of superclass can be assigned:
  - The reference variable of any child class that is derived from that superclass
  - Demo

Inheritance

- Any variable that is pointing to child class object:
  - When it is assigned to a reference variable which is of parent type
  - When a subclass reference is assigned to a superclass variable
  - Child c=new Child();
  - Parent p=new Parent();
  - p=c
  - You will have access to only those parts which are defined by parent class:
    - Because parent has no knowledge of what a child adds to its implementation

Super keyword

When a child wants to make reference to its immediate parent:

- It can do so by **super** keyword

Two Forms:

- First to call superclass or base class constructor
- Second to access a member of superclass

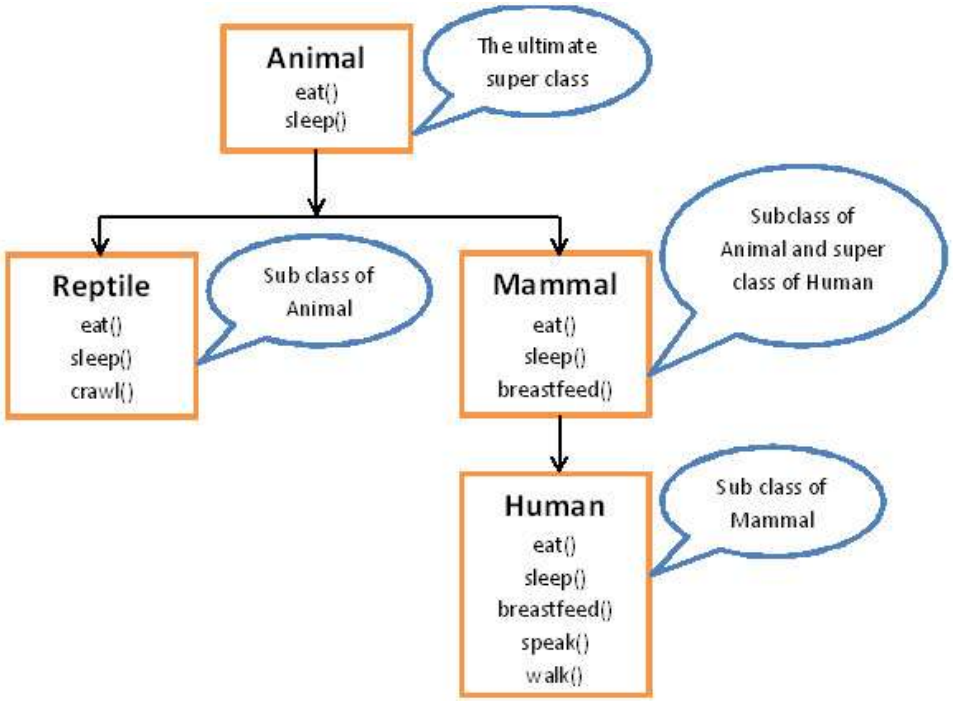
Using Super to call Base class Constructor, Demo

Using super with Data Members

- Prevents Name Hiding:
  - Parent class and child class have same data member name
  - Demo

Inheritance

- Multilevel hierarchy



Let’s create a Multi-Level Hierarchy

Demo

When constructors are executed?

Executed in order of derivation:

- Inside each constructor immediate super() is called automatically

Demo

Method Overriding

- A method in subclass has:
  - Same name
  - Same Type
  - Number and type of Parameters will be same
  - It overrides the parent class method

- When overridden method called by subclass:
  - Parent method is hidden

Demo

Accessing Parent class show method in subclass show method

```
class B extends A {
  int k;

  B(int a, int b, int c) {
    super(a, b);
    k = c;
  }

  void show() {
    super.show(); // this calls A's show()
    System.out.println("k: " + k);
  }
}
```

Overloading vs Overriding

Changing the number and type of parameters will cause the method to be overloaded

For Overriding we need Inheritance, while Overloading can still occur in one class

Demo

- Overloading parent method

Dynamic Method Dispatch

Calls to methods are resolved at run-time:

Way to Achieve Run-Time Polymorphism

Calls are resolved by examining:

Which object made the call to the mthod

Demo

Why Overriding?

Provides us Run-Time Polymorphism

Use of final keyword with Inheritance

To prevent method overriding

To prevent class inheritance

Using final to prevent inheritance

```
final class A {
  //...
}

// The following class is illegal.
class B extends A { // ERROR! Can't subclass A
  //...
}
```

Using final to prevent Overriding

```
class A {
  final void meth() {
    System.out.println("This is a final method.");
  }
}

class B extends A {
  void meth() { // ERROR! Can't override.
    System.out.println("Illegal!");
  }
}
```

Object Class

A special class

Which is parent of all the classes in java, and all other classes are subclasses of this class

Object Class Methods

Method	Purpose
Object clone( )	Creates a new object that is the same as the object being cloned.
boolean equals(Object *object*)	Determines whether one object is equal to another.
void finalize( )	Called before an unused object is recycled. (Deprecated by JDK 9.)
Class<?> getClass( )	Obtains the class of an object at run time.
int hashCode( )	Returns the hash code associated with the invoking object.
void notify( )	Resumes execution of a thread waiting on the invoking object.
void notifyAll( )	Resumes execution of all threads waiting on the invoking object.
String toString( )	Returns a string that describes the object.
void wait( ) void wait(long *milliseconds*) void wait(long *milliseconds*, int *nanoseconds*)	Waits on another thread of execution.