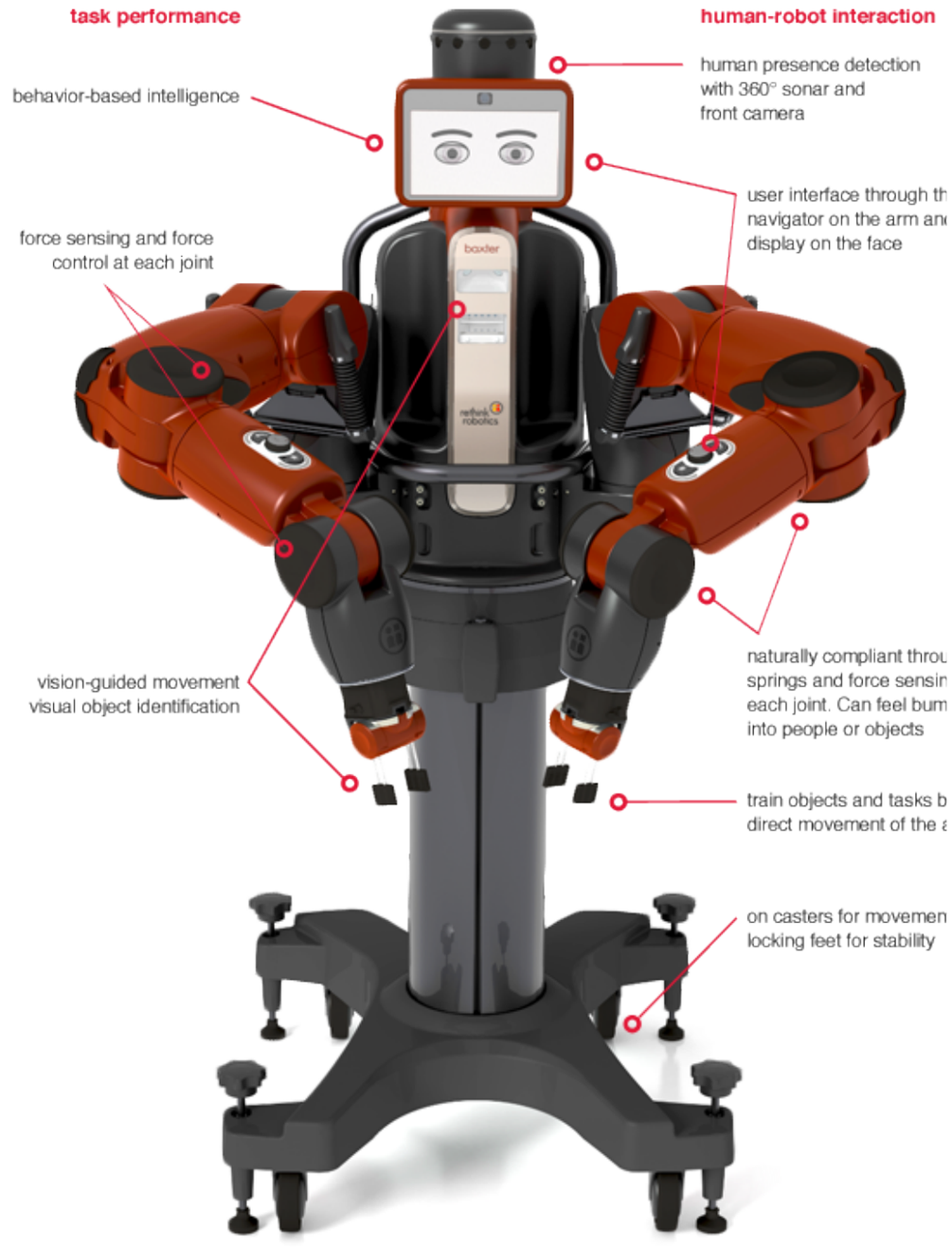
Inheritance

A problem with interfaces

TurtleBot

PR2



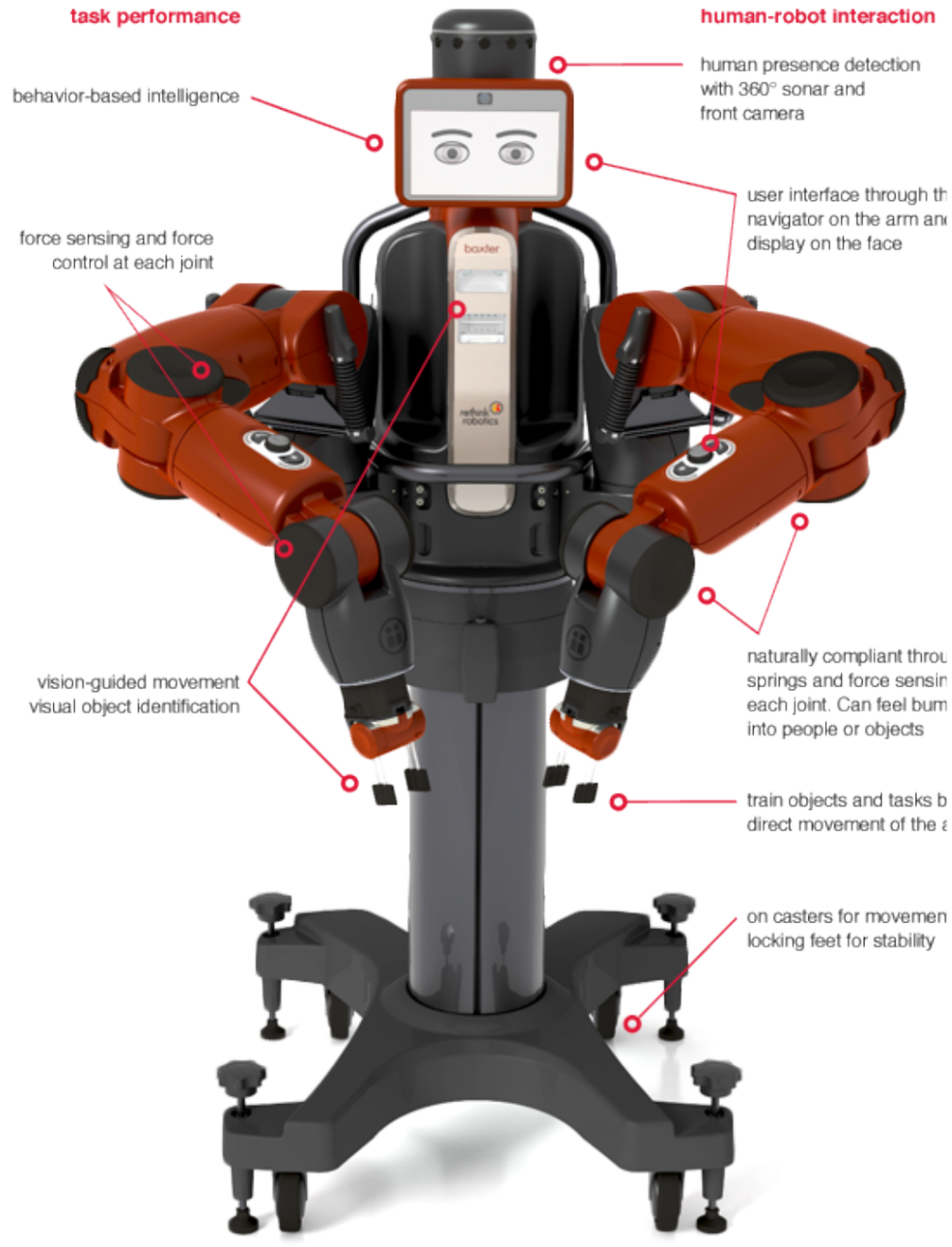
Baxter

The orange, it burns...it burns!

A problem with interfaces

TurtleBot

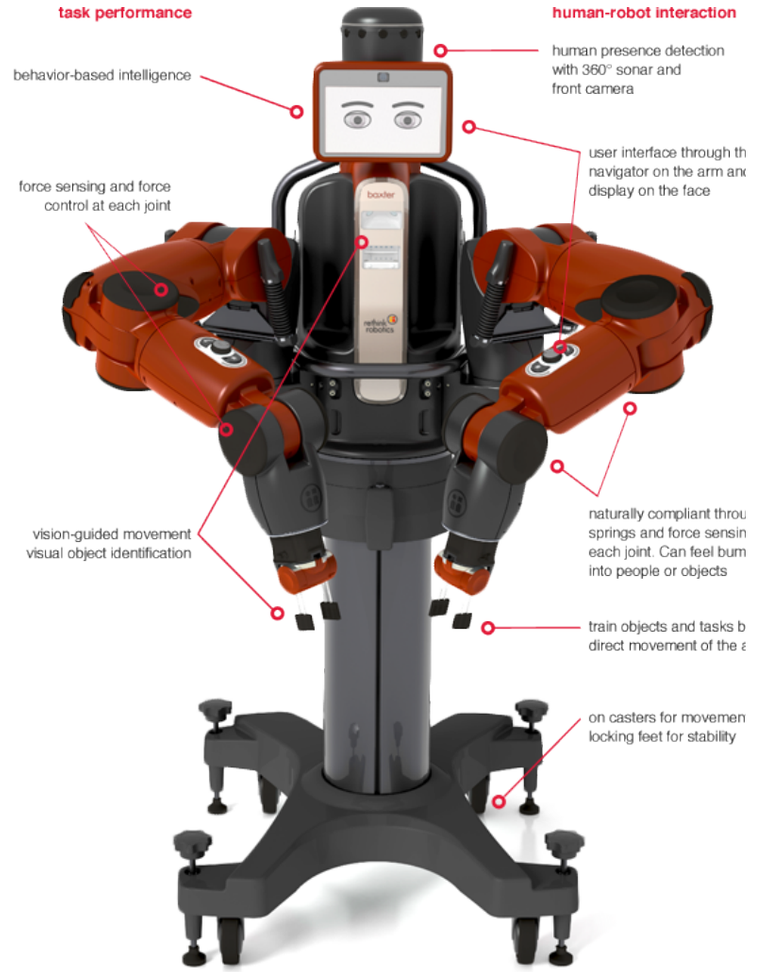
PR2



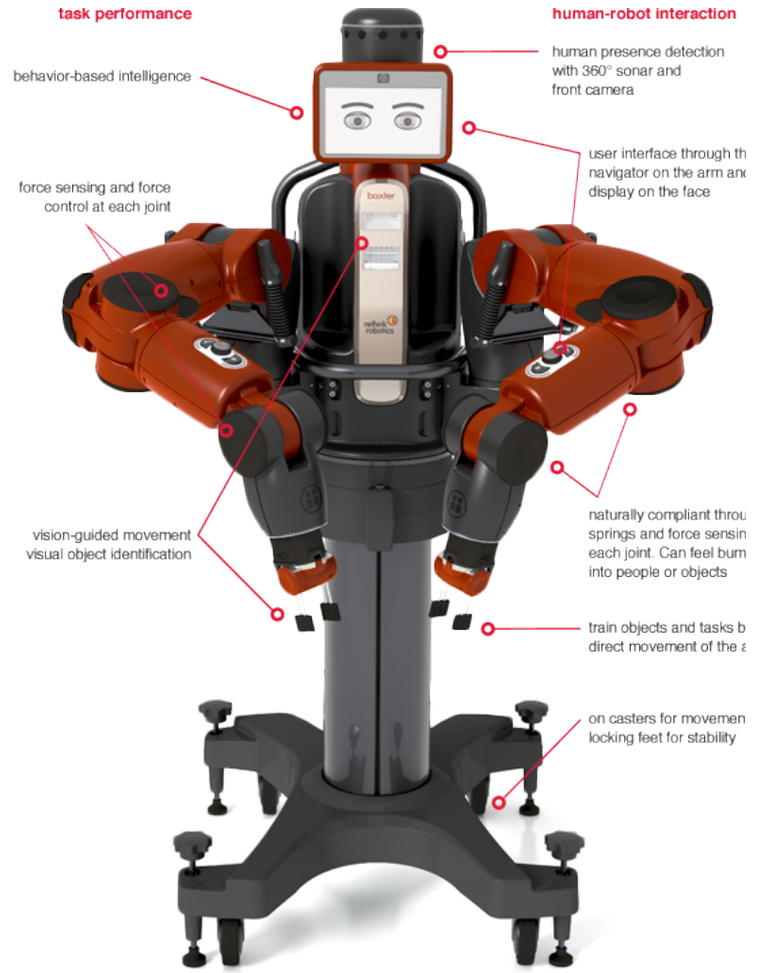
Baxter

http://goo.gl/pNaVn

```
public class Robot {
    private String myName;
    public Robot(String name) {
        myName = name;
    }

    public String getName() {
        return myName;
    }
}
```



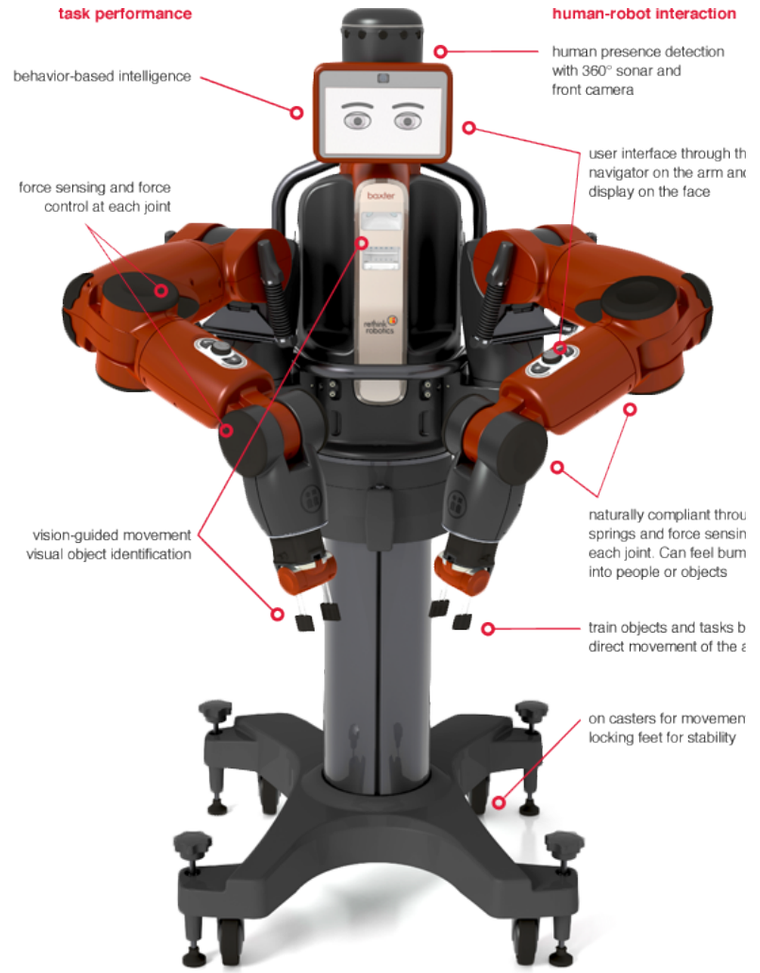
```java
public class Robot {
   private String myName;
   public Robot(String name) {
      myName = name;
   }

   public String getName() {
      return myName;
   }
}
```




```java
public class TwoArmedRobot extends Robot {
   public TwoArmedRobot(String name) {
      super(name);
   }

   public void raiseArms() {
      // ...arm control code.
   }
}
```

Subclass *Superclass*

```
public class TwoArmedRobot extends Robot {
   public TwoArmedRobot(String name) {
      super(name);
   }

   public void raiseArms() {
      // ...arm control code.
   }
}
```




```
Robot r = new Robot("R2D2");
System.out.println("r is named " + r.getName());
r.raiseArms(); // DOES NOT WORK
TwoArmedRobot pr2 = new TwoArmedRobot("pr2");
System.out.println("pr2 is named " + pr2.getName());
pr2.raiseArms();
```

Dispatch

```
public class A {
   // Code.
}
```

```
C c = new C();
c.doSomethingCool();
```

```
public class B extends A {
   // Code.
}
```

```
public class C extends B {
   // Code!
}
```

Check if class C has the method (or instance variable).
If not, check if class B has it.
If not, check if class A has it.
If not, check if Object has it.

Dispatch

```
public class A {
   public int x;
   public void doSomethingOk() {
     // Code!
   }
}

public class B extends A {
   public void doSomethingCool() {
     // Code!
   }
}

public class C extends B {
   public void doSomethingAwesome() {
     // Code!
   }
}
```

Capital letter "Oh"

http://goo.gl/fOVXq

Check if I have the method or variable.
Then (recursively) check my superclass.

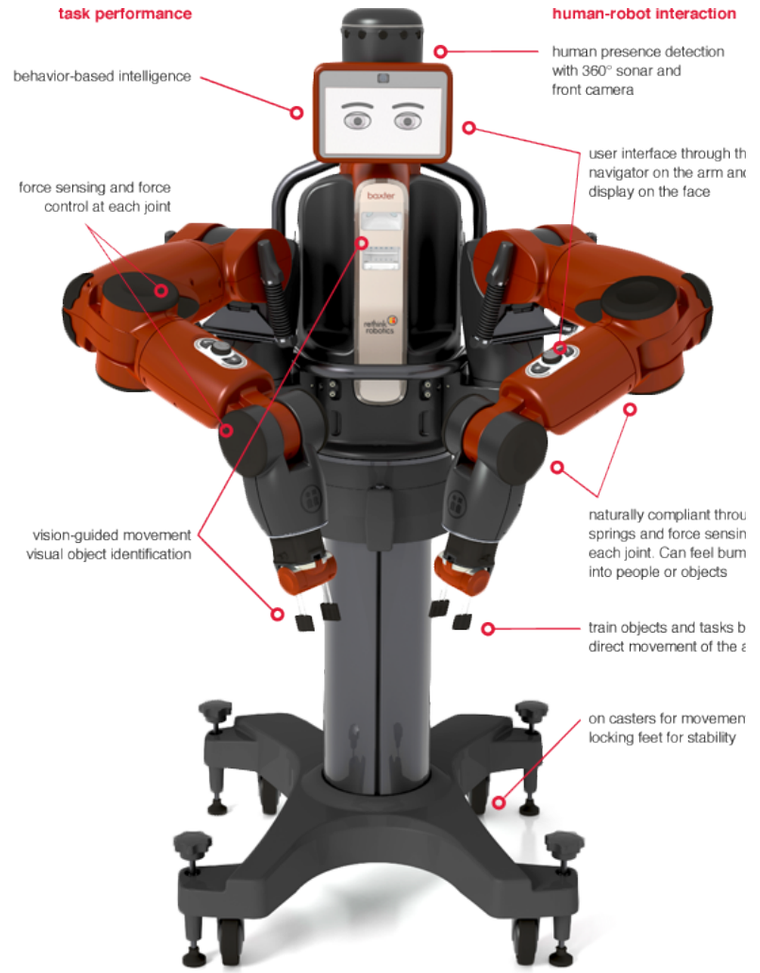
Overloading

```
public class D {
   public void doSomething() {
      System.out.println(“D”);
   }
}
```

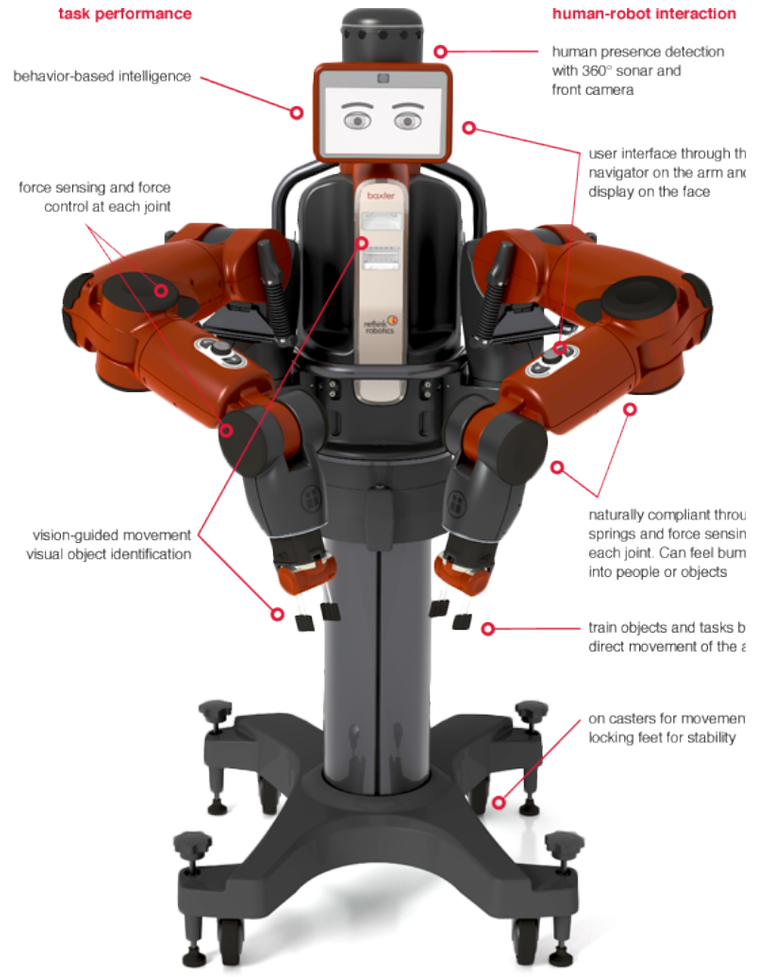
```
public class E extends D{
   public void doSomething() {
      System.out.println(“E”);
   }
}
```

Check if I have the method or variable.
Then (recursively) check my superclass.

```java
public class Robot {
    private String myName;
    public Robot(String name) {
        myName = name;
    }

    public String getName() {
        return myName;
    }
}

public class TwoArmedRobot extends Robot {
    public TwoArmedRobot(String name) {
        super(name);
    }

    public void raiseArms() {
        // ...arm control code.
    }
}
```



```
public abstract class Robot {
    private String myName;
    public Robot(String name) {
        myName = name;
    }

    public String getName() {
        return myName;
    }

    public abstract void eStop();
}

public class TwoArmedRobot extends Robot {
    public TwoArmedRobot(String name) {
        super(name);
    }

    public void raiseArms() {
        // ...arm control code.
    }

    public void eStop() {
        // STOP.
    }
}
```



Abstract methods work like interfaces.

When do I use...

Interfaces are very common:
"These classes can all do the same stuff."

Data inheritance is pretty common:
"These classes need some of the same instance variables."

Code inheritance is less common:
"These classes share part of *an implementation.*"

You can implement *multiple interfaces; you can only* extend *one class.*

To look into, if you're curious: the "protected" and "final" keywords.

Boggle!

Words words words

Words words words

Words words words

Words words words

...and others.

Words words words

...and others.

Automatic Boggle

You may assume a set dictionary of words.

We want an algorithm for finding every word on the board.

Tries!

Is ‘e’ a prefix?

Tries!

Is ‘e’ a prefix?

Is ‘ey’ a prefix?

Tries!

Is ‘e’ a prefix?

Is ‘ey’ a prefix?

Is ‘eyr’ a prefix?

Tries!

Is ‘e’ a prefix?

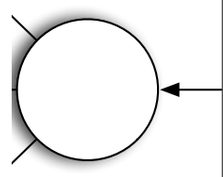
Is ‘ey’ a prefix?

Is ‘eyr’ a prefix?

Is ‘eyri’ a prefix?

(and then we’re stuck)

“She sells sea shells by the sea shore.”



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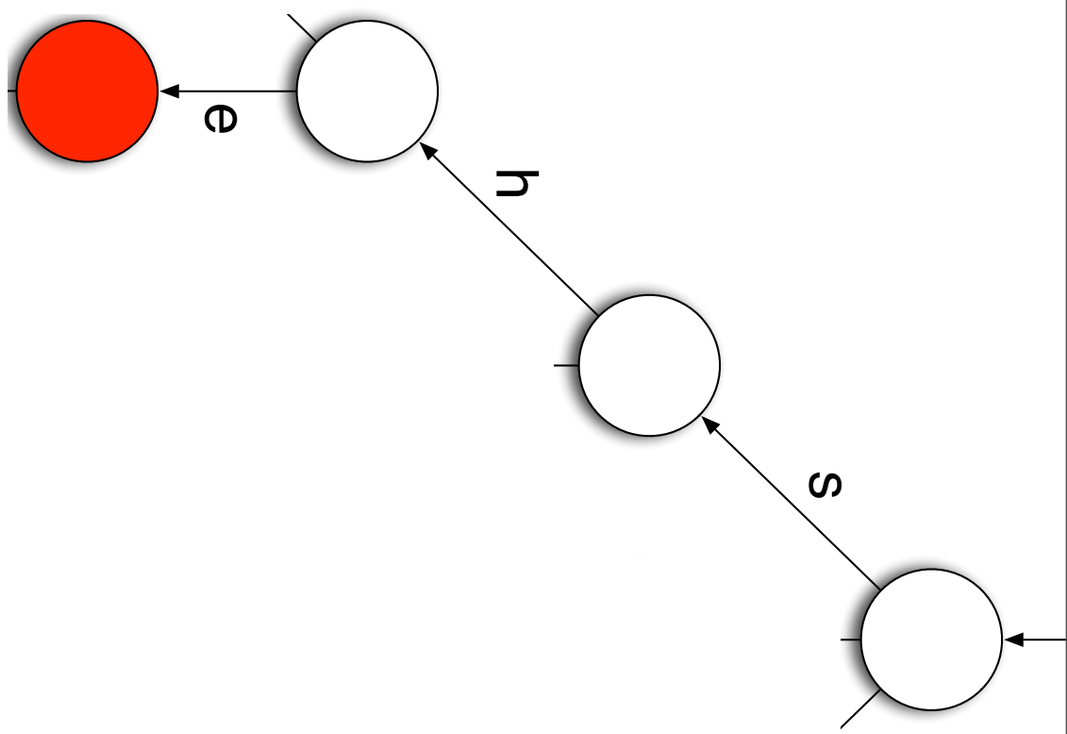

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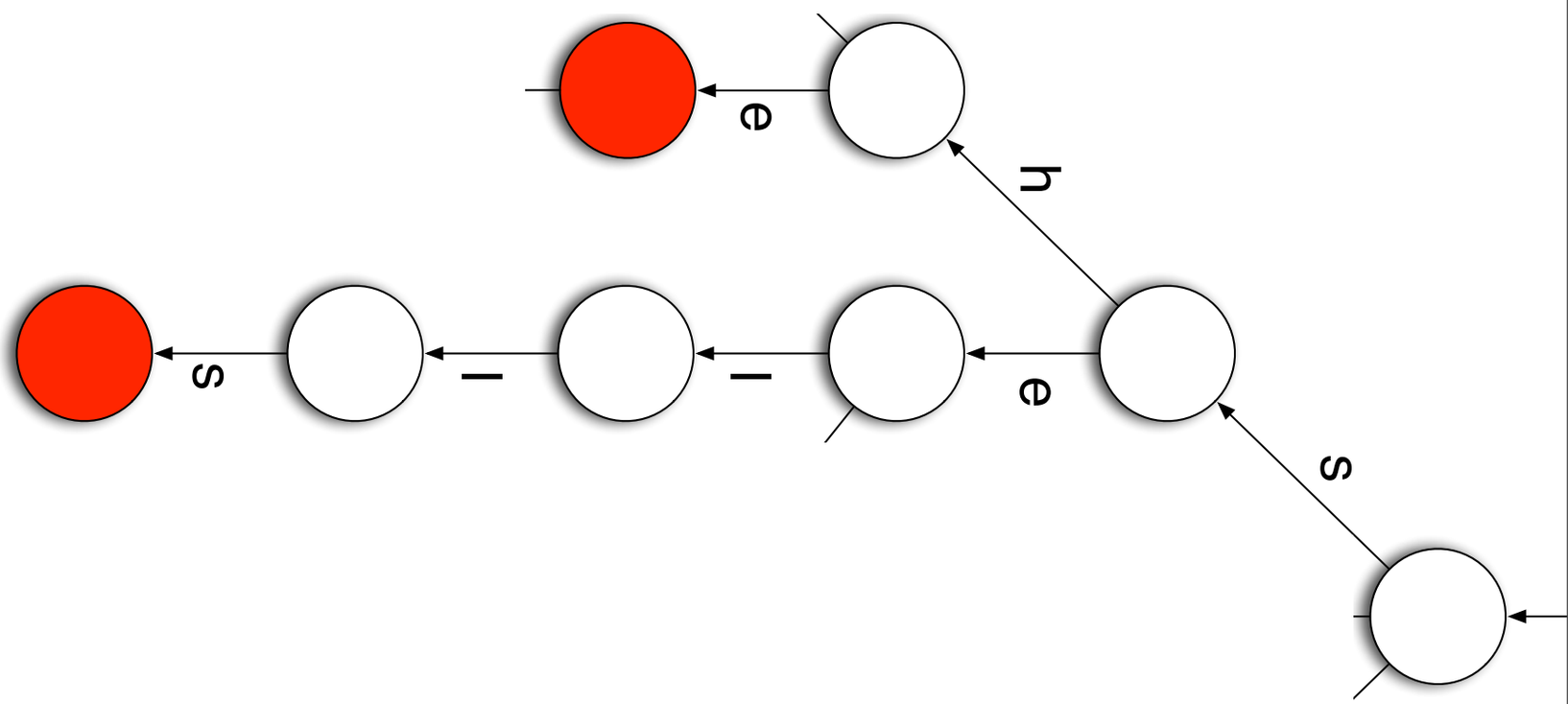

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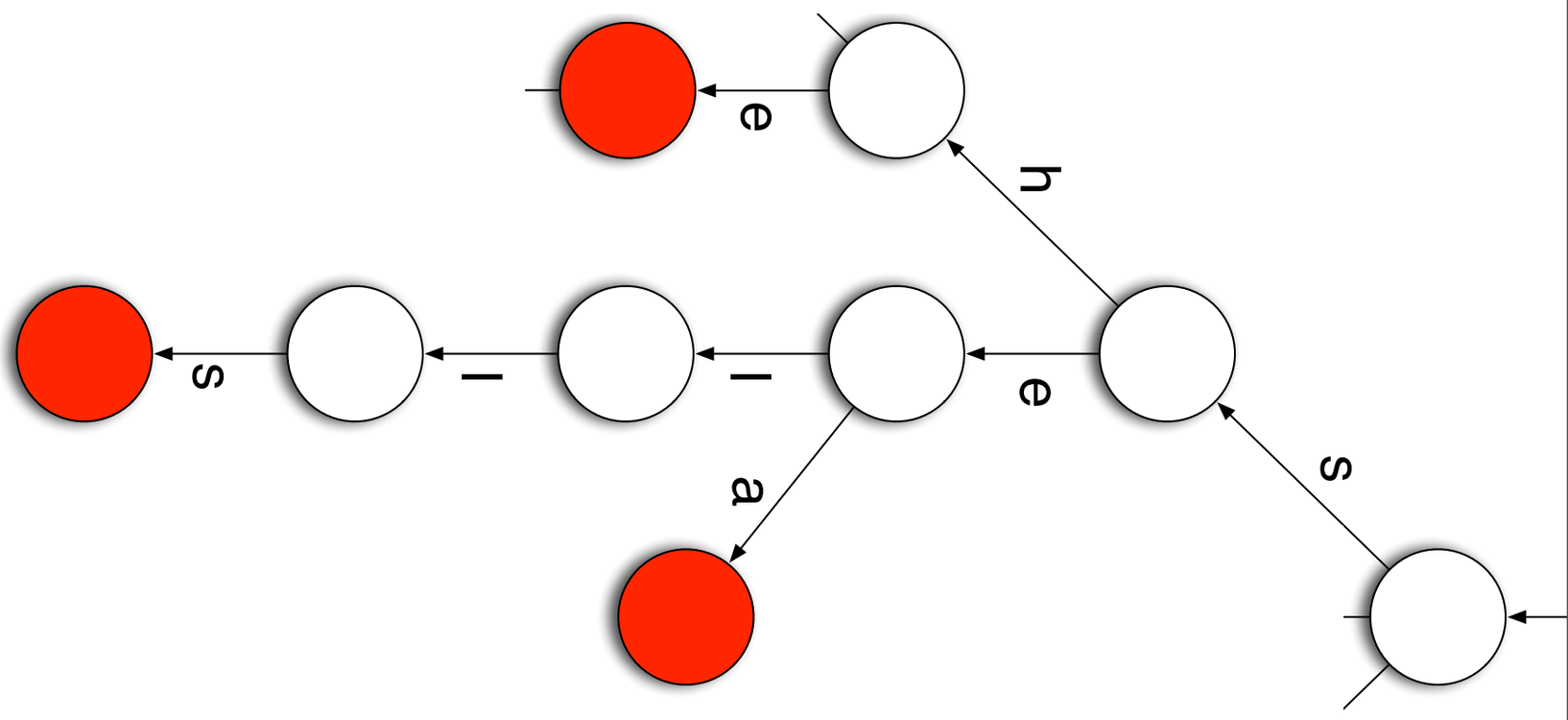

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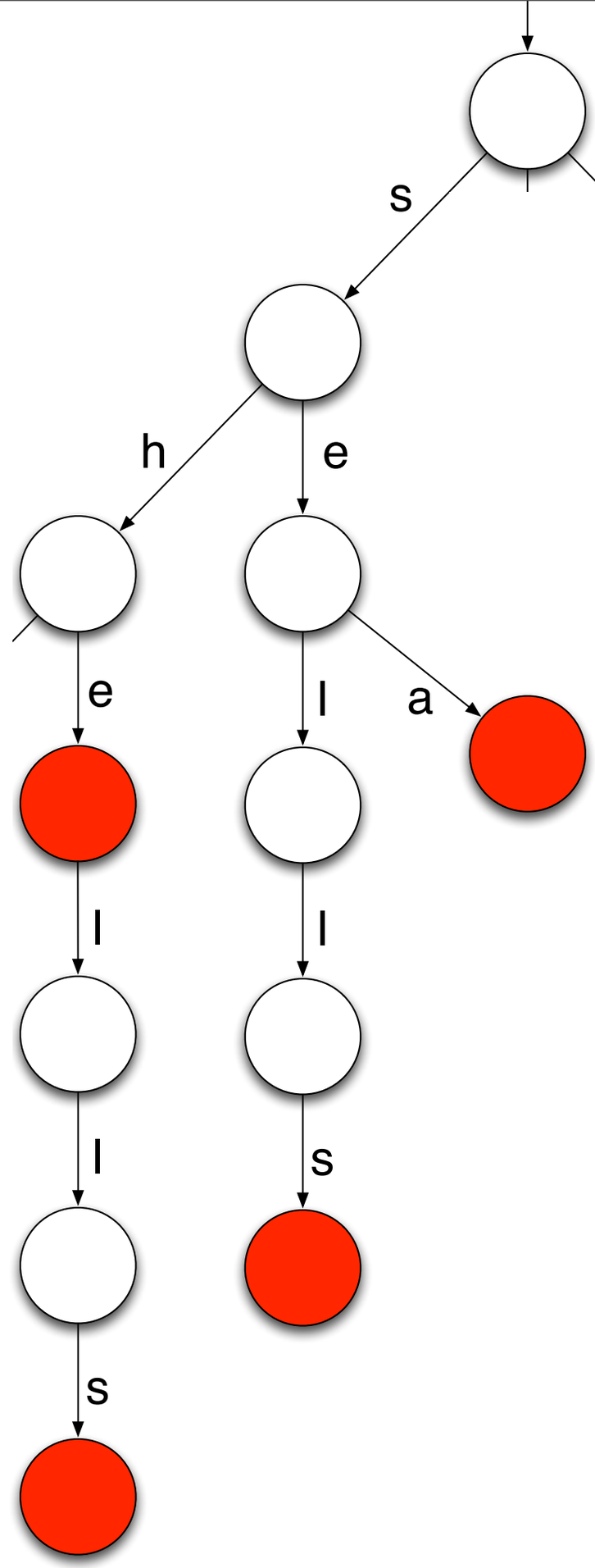

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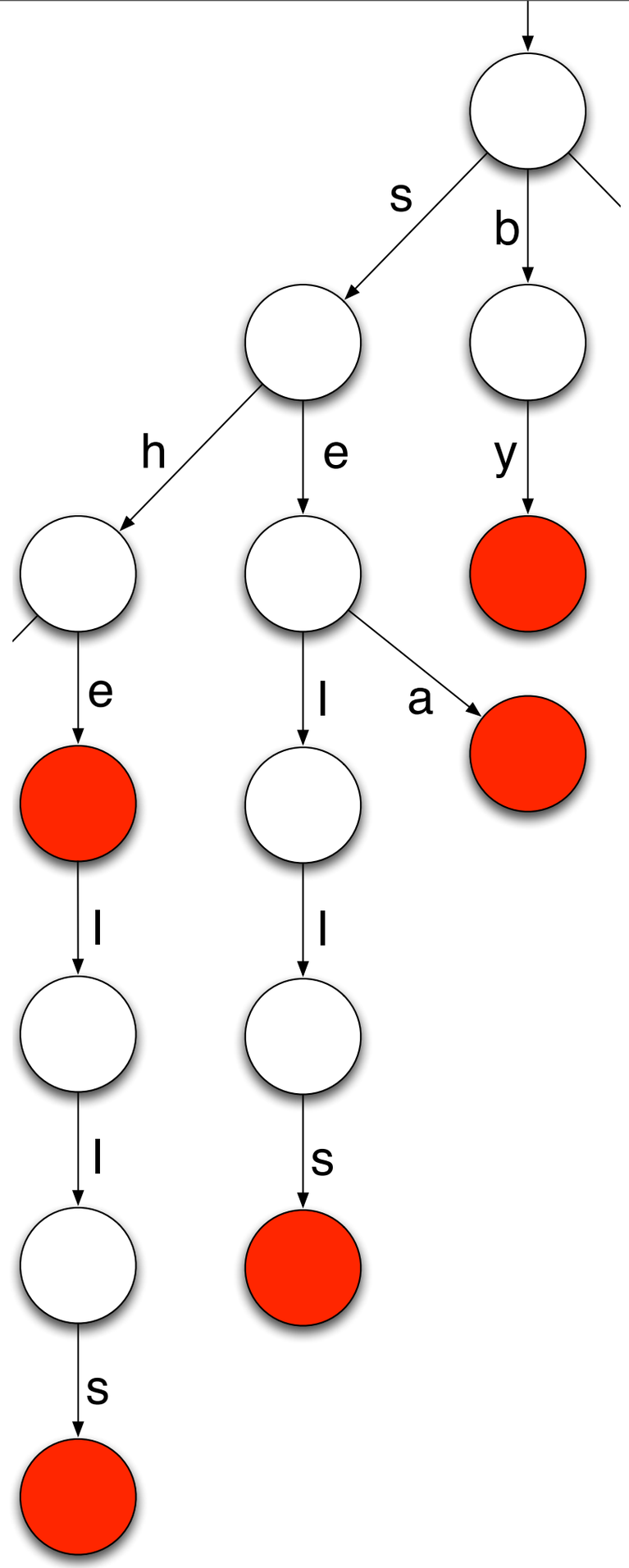

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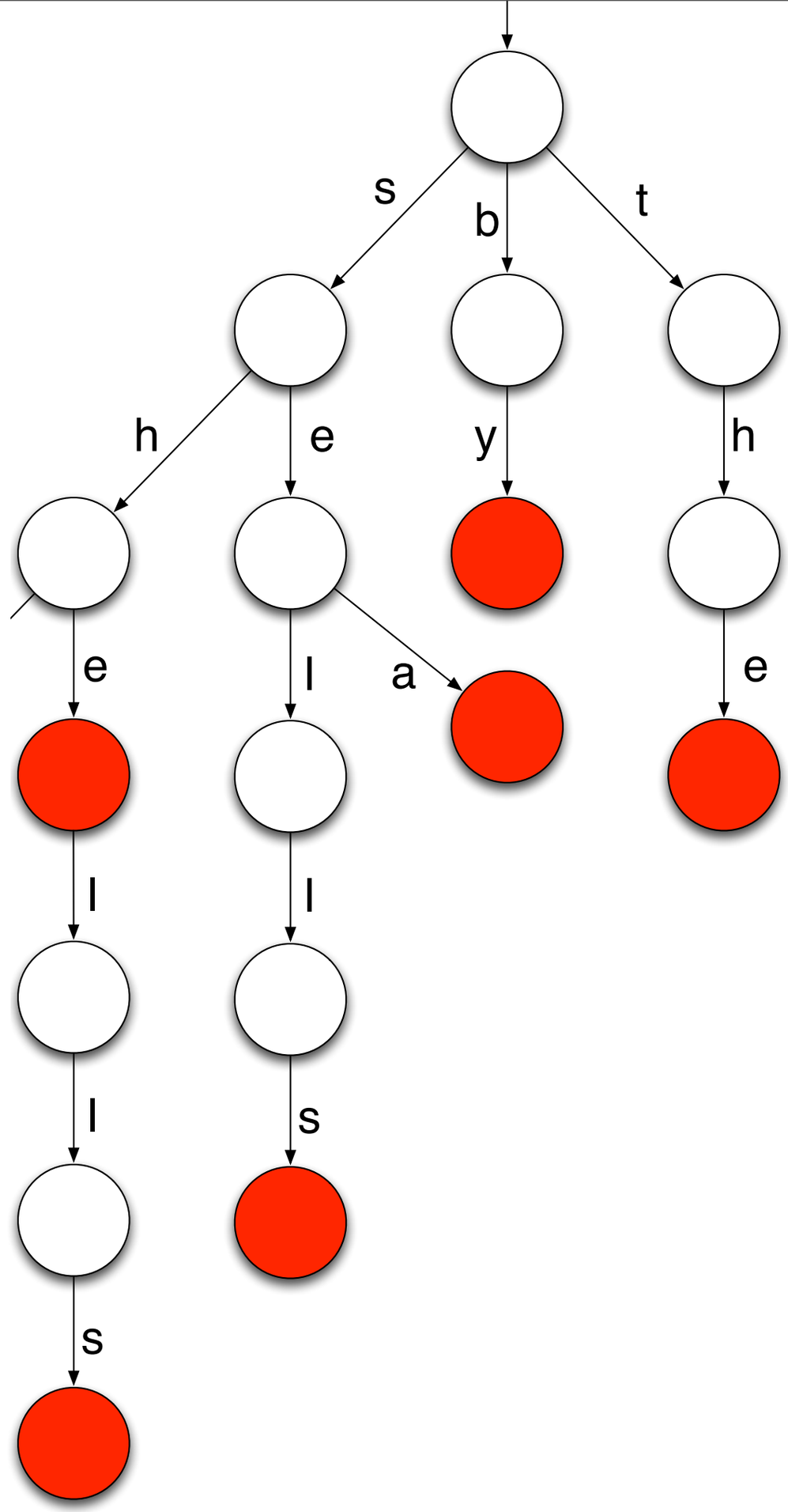

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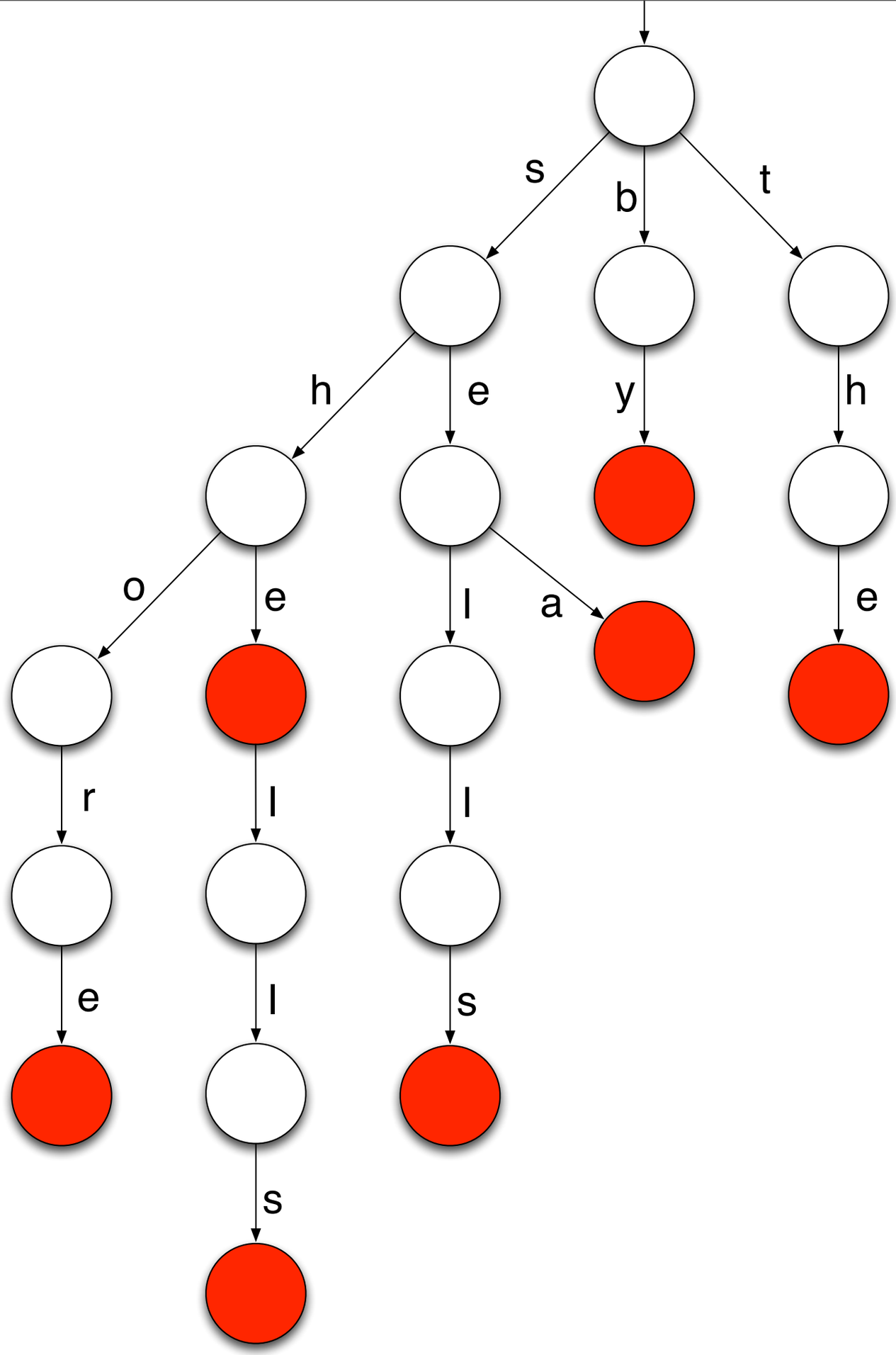

“Peter piper picked a peck of pickled peppers”

“Xavier has x-rayed his xylophone”

“Four score and seven years ago”

“Ulysses usually uses union u-boats”