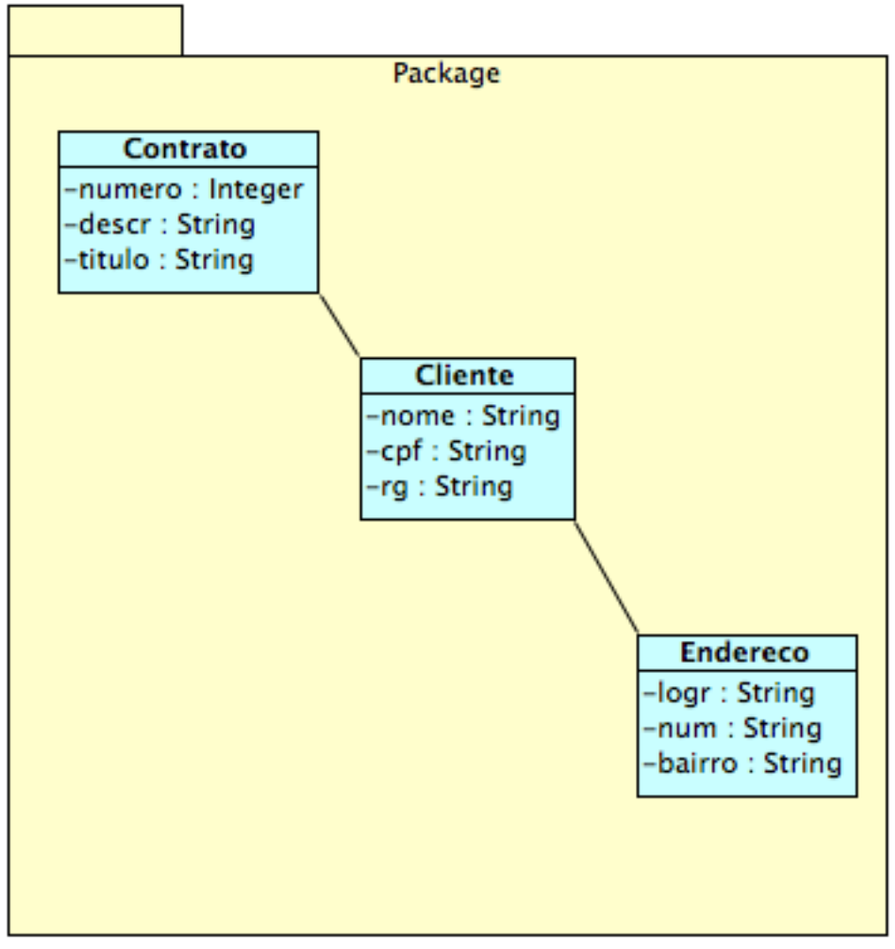
Orientação a Objetos

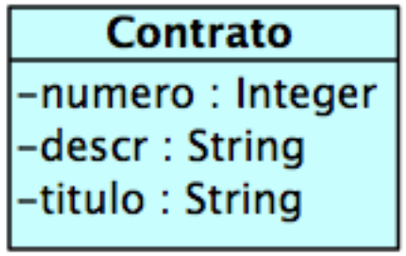
Agenda

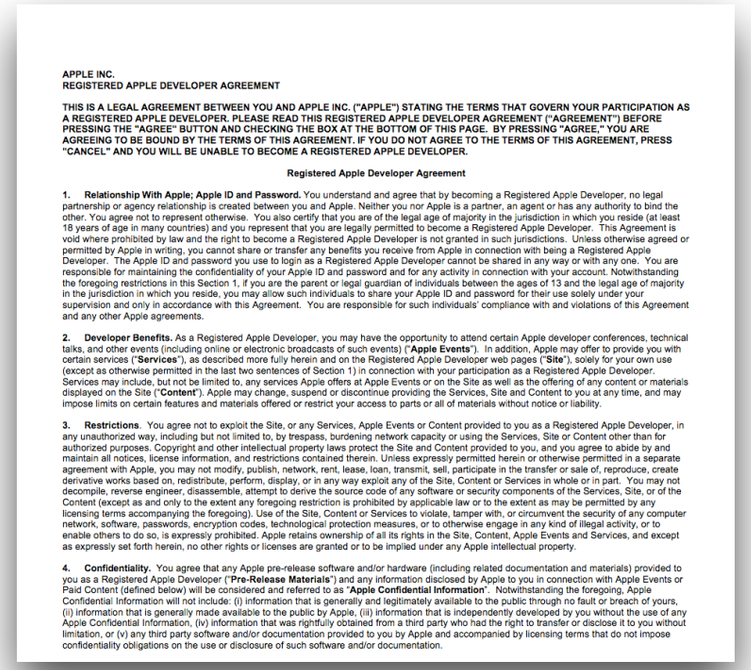
- Classes e Objetos
- Herança
- Agregação e Composição
- Inferência de Tipos, Tipos Genéricos, Métodos Genéricos e Tipos Alvo
- Interfaces
- Interfaces Funcionais
- Expressões Lambda
- Métodos referenciados



Classes e Objetos

Classes são estruturas de dados que representam abstrações de Objetos do mundo real.





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Estas abstrações são representadas na forma de atributos, necessários ao armazenamento da informações que serão utilizadas nas aplicações.

Classes e Objetos

Uma Classe é declarada contento um **nome**, seus **atributos privados** e os **métodos públicos**.

O nome da classe define um novo **Tipo de Dado** seus métodos permitem controlar a leitura e a gravação em seus atributos.

```java
public class Contrato {
  private String numero;
  private String descr;
  private String titulo;

  public String getNumero() {
      return numero;
  }

  public void setNumero(String numero) {
      this.numero = numero;
  }

  public String getDescr() {
      return descr;
  }

  public void setDescr(String descr) {
      this.descr = descr;
  }

  public String getTitulo() {
      return titulo;
  }

  public void setTitulo(String titulo) {
      this.titulo = titulo;
  }
}
```

Classes e Objetos

Uma Classe pode ser **publica** ou **privada**, **abstrata** ou **final**.

Public permite sua utilização em qualquer local, **private** oculta sua implementação.

Abstract exige a complementação se sua implementação, **final** impede sua extensão (herança).

```
private class Produto { }

public class Processo { }

public abstract class Figura {
    public abstract void exibir();
}

public final class String { }
```

Atributos e métodos

Os atributos representam as informações que fazem parte das classes. Os métodos representam as ações ou mensagens que podemos requisitar ou enviar aos objetos.

Eles podem ser **privados**, **protegidos** e **públicos**.

A estas características permitem controlar o nível de encapsulamento destes atributos e métodos.

```
public abstract class Figura {
  private Integer coordenada;
  public String nome;
  protected String tipo;

  public void move(int x, int y) { }

  public abstract void desenha();
}
```

Atributos e métodos

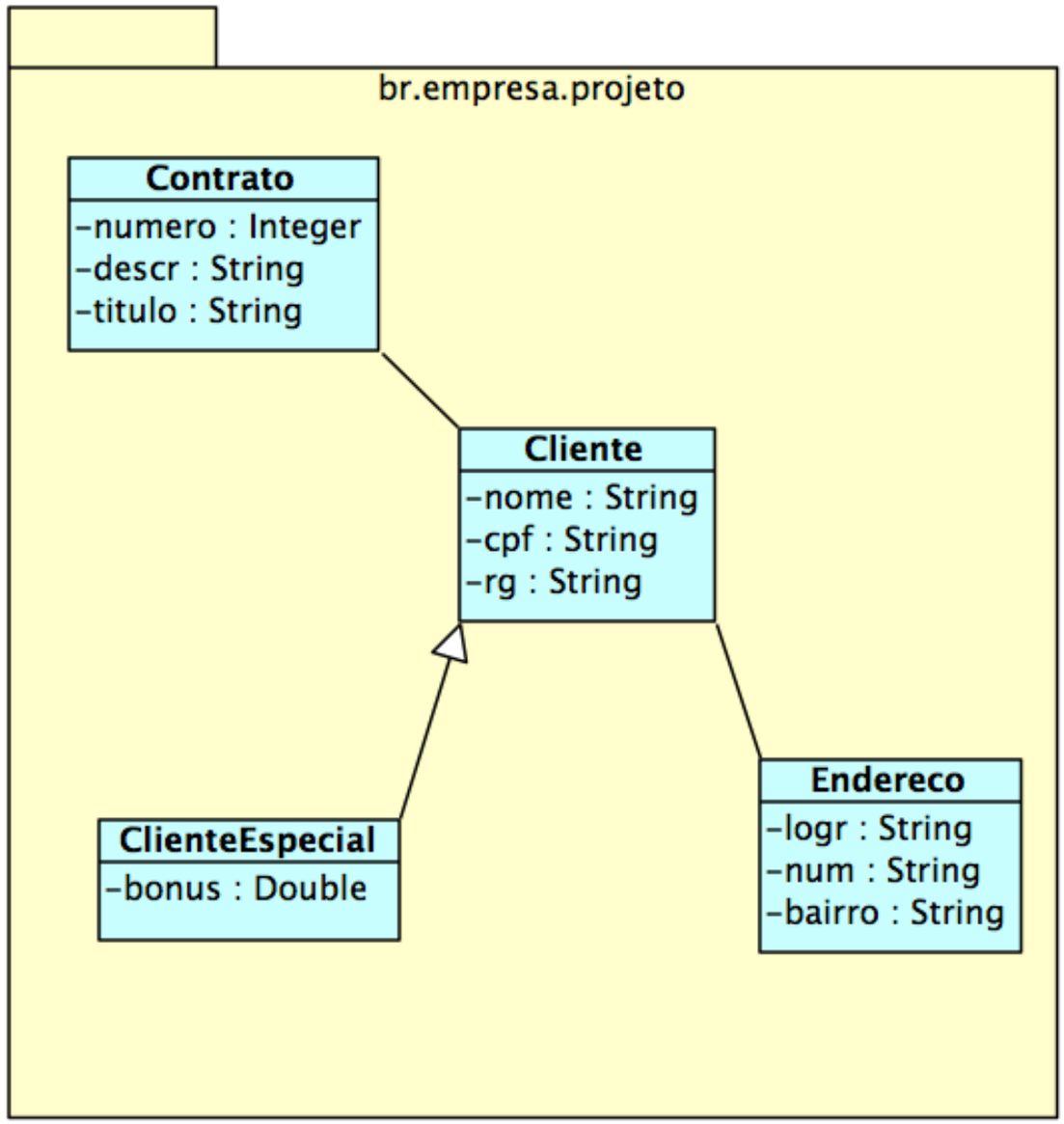
Podemos definir a forma de utilização dos atributos e métodos com os modificadores **static**, **final** e **transient**.

Com **static** fixamos os atributos e métodos na classe e não no objeto, com **final** criamos atributos constantes e impedimos a substituição de métodos, quando utilizando herança, por fim **transient** declara atributos temporários.

```
class Circulo extends Figura {
  private final Integer posicao = 100;
  private transient String temp;
  private static Integer tamanho;

  @Override
  public void desenha() { }
}
```

Relacionamento entre Classes de Objetos

Os relacionamentos e interações existentes entre as classes de objetos são representadas na forma de **heranças**, **agregações**, **composições** e **referências**.



Herança

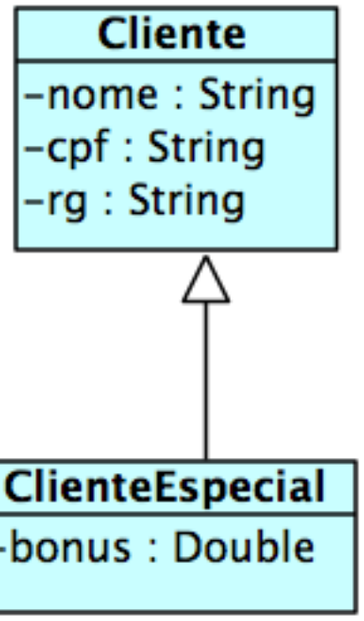
A Herança permite a especialização de uma Classe, desta forma poderemos ampliar as implementações de algoritmos além do que já foi declarado na Super Classe.

Utilizamos a palavra reservada **extends** para criar herança entre classes.

Usamos **this** para referenciar o próprio objeto e **super** para referenciar o objeto pai.

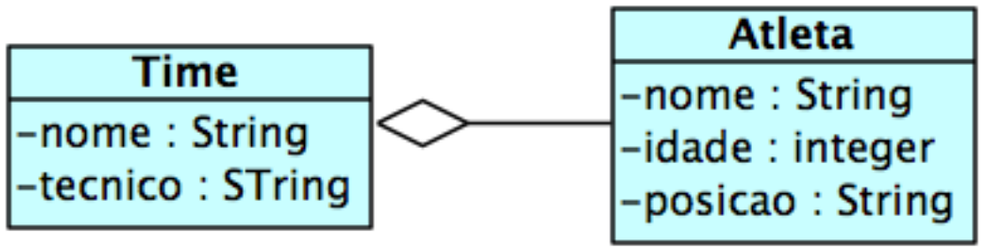
```java
public class Cliente {
  private String nome;
  private String cpf;
  private String rg;

  public String getNome() {..

  public void setNome(String nome) {..

  public String getCpf() {..

  public void setCpf(String cpf) {..

  public String getRg() {..

  public void setRg(String rg) {..
}
```

```java
public class ClienteEspecial extends Cliente {
  private Double bonus;

  public Double getBonus() {..

  public void setBonus(Double bonus) {..
}
```

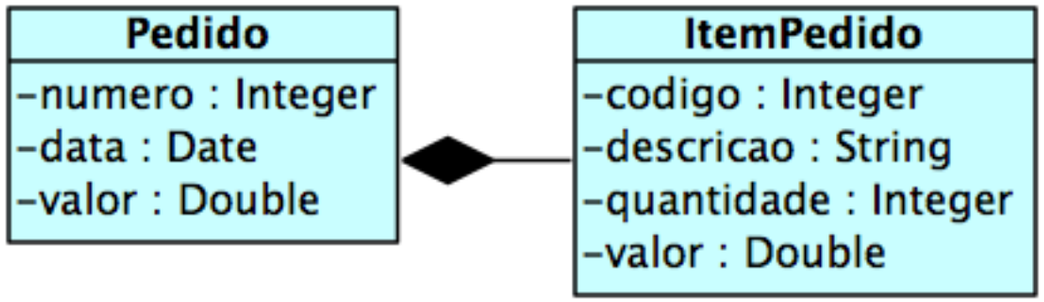


Agregação e composição

Chamamos de agregação ou composição, quando uma classe necessita de outra para sua construção.



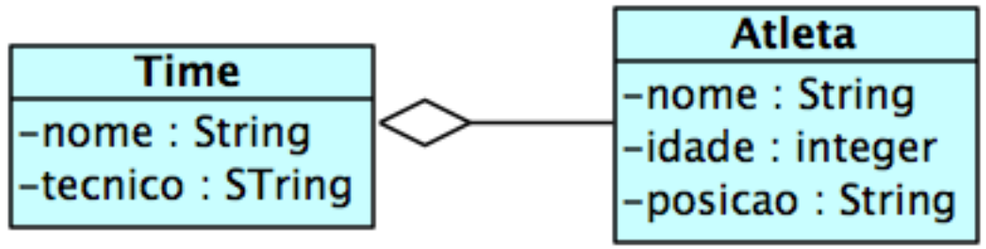
Se a relação entre as classes é mais fraca chamamos de **agregação**, se for mais forte chamamos de **composição**.



Agregação

Na agregação o Time pode ter zero ou mais Atletas.

Esta relação é 1 para 0 ou N, assim temos uma coleção de Atletas como atributo no Time.



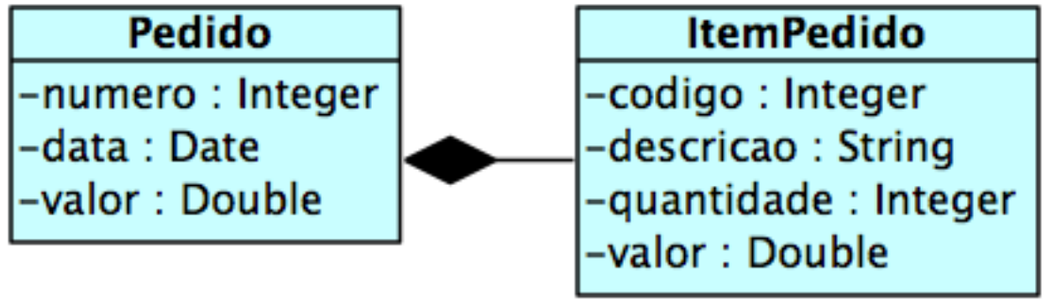

```
class Time {
    private String nome;
    private String tecnico;
    private Set<Atleta> oAtleta;
}
```

```
class Atleta {
    private String nome;
    private Integer idade;
    private String posicao;
}
```

Composição

Na composição o Pedido tem ter um ou mais Itens de Pedido.

Esta relação é 1 para N, assim temos uma coleção de ItemPedido como atributo no Pedido.

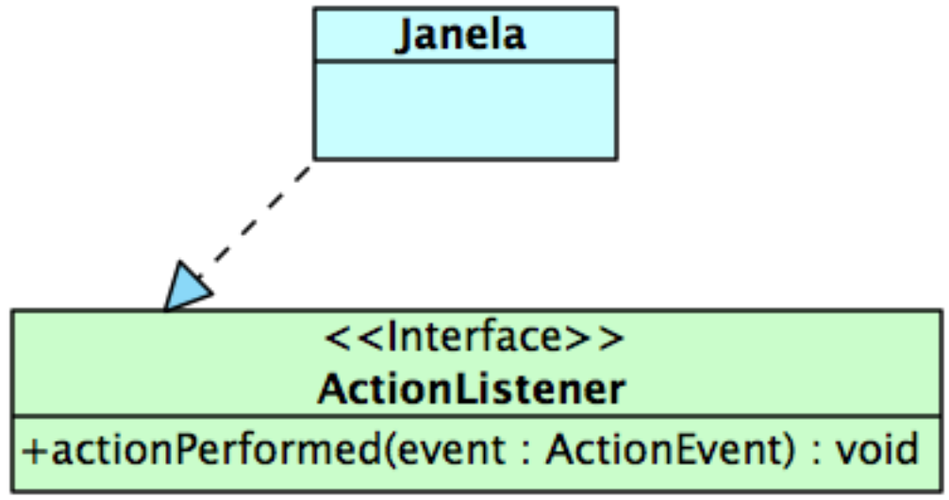



```
class Pedido {
    private Integer numero;
    private Date data;
    private Double valor;
    private Set<ItemPedido> itens;
}

class ItemPedido {
    private Integer codigo;
    private String descricao;
    private Integer quantidade;
    private Double valor;
}
```

Interfaces

As **Interfaces** representam contratos que as classe devem implementar.

Uma classe pode implementar mais de uma interface.




```
class Janela implements ActionListener {
  @Override
  public void actionPerformed(ActionEvent e) {
  }
}
```

Interfaces

Uma classe pode implementar uma interface de várias maneiras.

As duas últimas formas utilizam expressões Lambda em sua implementação.

```
class FazAlgo implements Comparator<Cliente> {
  @Override
  public int compare(Cliente o1, Cliente o2) {
    return o1.getNome().compareTo(o2.getNome());
  }
}

Arrays.sort(lista, new FazAlgo());
```

```
Arrays.sort(lista, new Comparator<Cliente>() {
  @Override
  public int compare(Cliente o1, Cliente o2) {
    return o1.getNome().compareTo(o2.getNome());
  }
});
```

```
Arrays.sort(lista, (Cliente o1, Cliente o2) ->
     o1.getNome().compareTo(o2.getNome())
 );
```

```
Arrays.sort(lista, (o1, o2) ->
     o1.getNome().compareTo(o2.getNome())
 );
```

Interfaces Funcionais

As interfaces funcionais fornecem tipos de retorno para as expressões lambda e referências de métodos.

Cada interface funcional tem um método abstrato simples, chamado de método funcional para essa interface, para a qual o parâmetro de expressão lambda e tipos de retorno são combinados ou adaptados.

```
@FunctionalInterface
public interface Runnable {
  public abstract void run();
}
```

Tipos Genéricos

Um Tipo genérico é uma classe ou uma interface que é parametrizada por um tipo.

Este tipo pode ser utilizado como tipo de argumentos ou de retorno em métodos e atributos.

```
class Box<T> {
  private T item;

  public void set(T item) {
      this.item = item;
  }

    public T get() {
        return item;
    }
}
```

Expressões Lambda

A expressão Lambda representa funções anônimas.

São compostas por um ou mais argumentos, o operador Lambda **->** , e o bloco da função.

As expressões Lambda permitem que um bloco de lógica seja passado como argumento na chamada a um método.

```
Cliente[] lista = {
    new Cliente()
        .setNome("Fulano")
        .setEmail("fulano@gmail.com")
        .setIdade(22),
    new Cliente()
        .setNome("Beltrano")
        .setEmail("beltrano@bol.com.br")
        .setIdade(32) };

Arrays.sort(lista,
    (o1, o2) -> o1.getNome().compareTo(o2.getNome()));

Arrays.stream(lista)
    .filter(e -> e.getIdade() > 20)
    .forEach((e) -> System.out.println(e));
```

Métodos referenciados

Referência a métodos se semelham a atalhos para algumas formas de expressões Lambda.

Método referenciado	Expressão Lambda equivalente
`String::valueOf`	`x -> String.valueOf(x)`
`Object::toString`	`x -> x.toString()`
`x::toString`	`() -> x.toString()`
`ArrayList::new`	`() -> new ArrayList<>()`

Referências

- http://www.oracle.com/events/us/en/java8/index.html
- http://www.techempower.com/blog/2013/03/26/everything-about-java-8/
- http://docs.oracle.com/javase/8/docs/api/java/util/function/package-summary.html
- http://docs.oracle.com/javase/tutorial/index.html
- http://www.oracle.com/technetwork/java/javase/8-whats-new-2157071.html