webmasters akademie Nürnberg GmbH

Interne DSLs in Ruby

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Domain Specific Language?

Mini-Sprache für spezifisches Problem

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Nicht zwingend Turing-Complete

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SQL

CSS

Domain Specific Language?

Mini-Sprache für spezifisches Problem

Nicht zwingend Turing-Complete

SQL

Make

CSS

Domain Specific Language?

Mini-Sprache für spezifisches Problem

Nicht zwingend Turing-Complete

XML-Configuration-Files

SQL

CSS

Make

Domain Specific Language?

Selten so **umfangreich** wie SQL oder CSS

Domain Specific Language?

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Zoo kleiner anwendungsspezifischer DSLs

Domain Specific Language?

Selten so **umfangreich** wie SQL oder CSS

Zoo kleiner anwendungsspezifischer DSLs

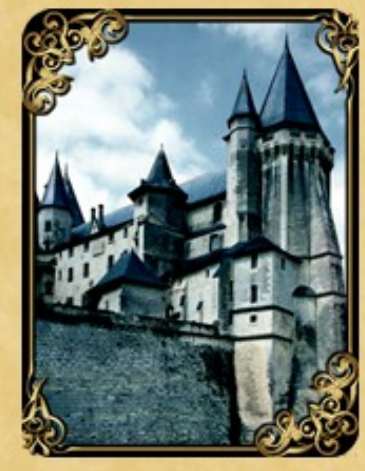
DSL
statt
API

Beispiel

Fantasy Cards RT - free Online TCG

What is Fantasy Cards RT?

Fantasy Cards RT is (probably) the first **real time online TCG** (Trading Card Game). It is a tcg, you can play online in your browser. Build your own decks and eventually even your own cards. It's, however, not finished yet. This online tcg is still an (**alpha version**).



Features

- **Online TCG**: Play it online any time
- **Browser-based**: No download required
- **Real Time**: No more waiting
- **Customizable**: Build your own **deck**
- **Free to play**: no costs at all!
- **Community Driven**: We need your ideas!

Try It

- **PLAY** the alpha version of this online tcg
- **SIGN UP** for free!
- Report bugs and discuss game ideas in the **FORUM**

Search Fantasy Cards

Google™ Custom Search

Search

Screenshots

Fantasy-Cards.net

Fantasy Cards RT

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Fantasy Cards RT - free Online TCG

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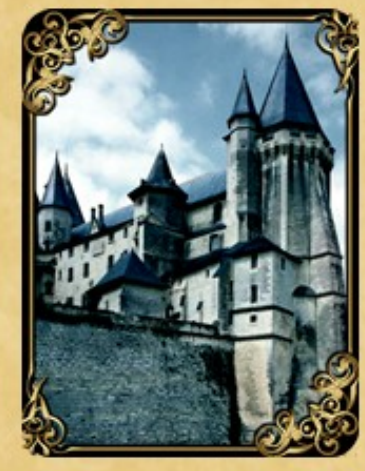

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Google™ Custom Search

Search

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2 DSLs in Fantasy Cards

2 DSLs in Fantasy Cards

Kartenbeschreibungen

2 DSLs in Fantasy Cards

Kartenbeschreibungen

LevelScripte


Cave Dragon (2)
3
1
15
Flying
Flame Attack - 36 sec: Mass Attack to Front
Scale Growth - 36 sec, 2 Iron: +1 Armor (3 charges)
It is rumored that Cave Dragons eat iron to strengthen their scales
Dragon, Unit, Organic, Combat

Name

Attack

Armor

Health

Costs

Rules / Actions

Tags


```
dragon = Card.new('Cave Dragon', 'swamp_drake')

dragon.rules = %{
    Flying
    <b>Flame Attack</b> - 36 sec: Mass Attack to Front
    <b>Scale Growth</b> - 36 sec, 2 Iron: +1 Armor (3 charges)
    <i> … Cave Dragons eat iron to strengthen their scales</i>
}

dragon.add_tag(Tag.new('dragon'))
dragon.add_tag(Tag.new('unit'))
dragon.add_tag(Tag.new('organic'))
dragon.add_tag(Tag.new('combat'))

dragon.attributes = AttributeContainer.new
dragon.attributes['attack']= Attribute::Base.new(3)
dragon.attributes['armor'] = Attribute::Armor.new(1)
dragon.attributes['health']= Attribute::Health.new(1)
…[3 Zeilen gekürzt]

play = ActionBase::Play.new('play', 9)
dragon.add_action(play)

fly = ActionBase::Fly.new('fly', 9)
dragon.add_action(fly)

attack = ActionBase::Attack.new('attack', 24)
dragon.add_action(attack)

flame_attack = ActionBase::MassAttack('flame', 36)
flame_attack.target_area = Card.area_in_front_of
dragon.add_action(flame_attack)

scale_growth = ActionBase::Direct('scale_growth', 36)
scale_growth.icon = 'reinforce_armor'
scale_growth.num_charges = 3,
scale_growth.show_only_in = 'field'
scale_growth.costs = [Cost.new('iron', 2)]

def scale_growth.formula
  card[:armor] ||= 0
  card[:armor] += 1
end

dragon.add_action(scale_growth)
CardBuildersRepository.register(dragon)
```


```
dragon = Card.new('Cave Dragon', 'swamp_drake')

dragon.rules = %{
    Flying
    <b>Flame Attack</b> - 36 sec: Mass Attack to Front
    <b>Scale Growth</b> - 36 sec, 2 Iron: +1 Armor (3 charges)
    <i> … Cave Dragons eat iron to strengthen their scales</i>
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…[3 Zeilen gekürzt]

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flame_attack = ActionBase::MassAttack('flame', 36)
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  card[:armor] += 1
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dragon.add_action(scale_growth)
CardBuildersRepository.register(dragon)
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Cave Dragon

```
Image: swamp_drake

Rules:
  Flying
  <b>Flame Attack</b> - 36 sec: Mass Attack to Front
  <b>Scale Growth</b> - 36 sec, 2 Iron: +1 Armor (3 charges)
  <i>... Cave Dragons eat iron to strengthen their scales</i>

Attributes:
  attack      3
  armor       1
  health     15
  stone_cost  2
  gold_cost   2
  power       2


Actions:
  play                9
  fly                12
  attack             24

  flame_attack       36, target_area: card.area_in_front_of

  scale_growth (direct) 36, 3 charges
    icon: reinforce_armor
    formula: armor += 1,
    show only in field,
    costs: 2 iron

Tags: dragon, unit, organic, combat
```

Cave Dragon

Image: swamp_drake

```
Rules:
  Flying
  <b>Flame Attack</b> - 36 sec: Mass Attack to Front
  <b>Scale Growth</b> - 36 sec, 2 Iron: +1 Armor (3 charges)
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  health      15
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  gold_cost    2
  power        2
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Actions:
  play                 9
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  scale_growth (direct) 36, 3 charges
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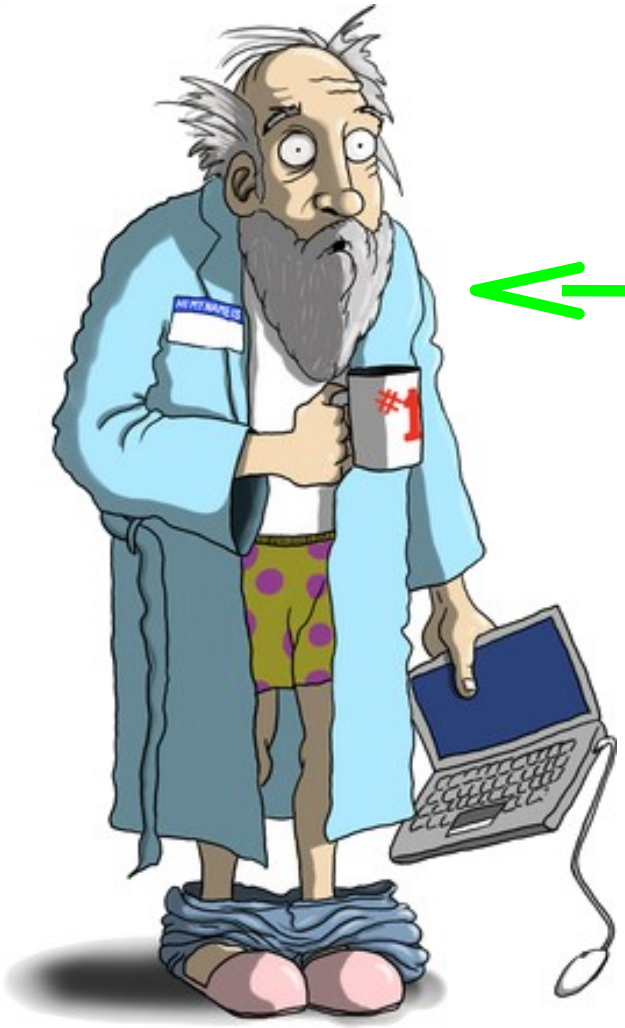
Tags: dragon, unit, organic, combat

Warum DSLs?

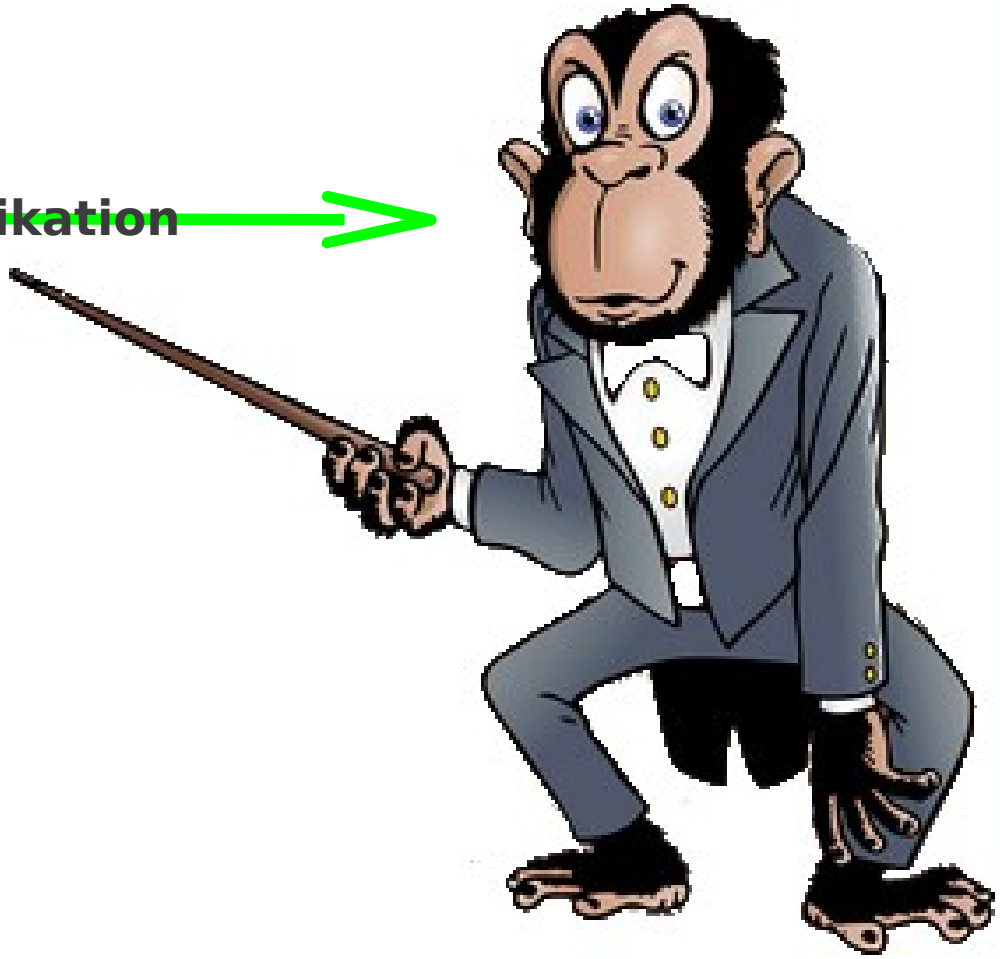
Kommunikation



Kommunikation

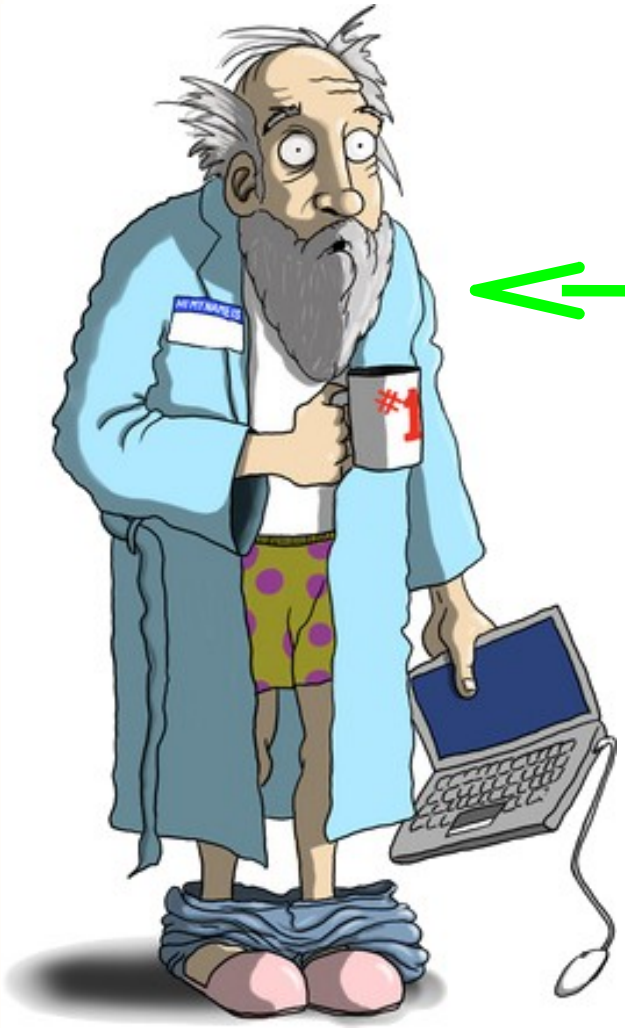
Entwickler

Kommunikation



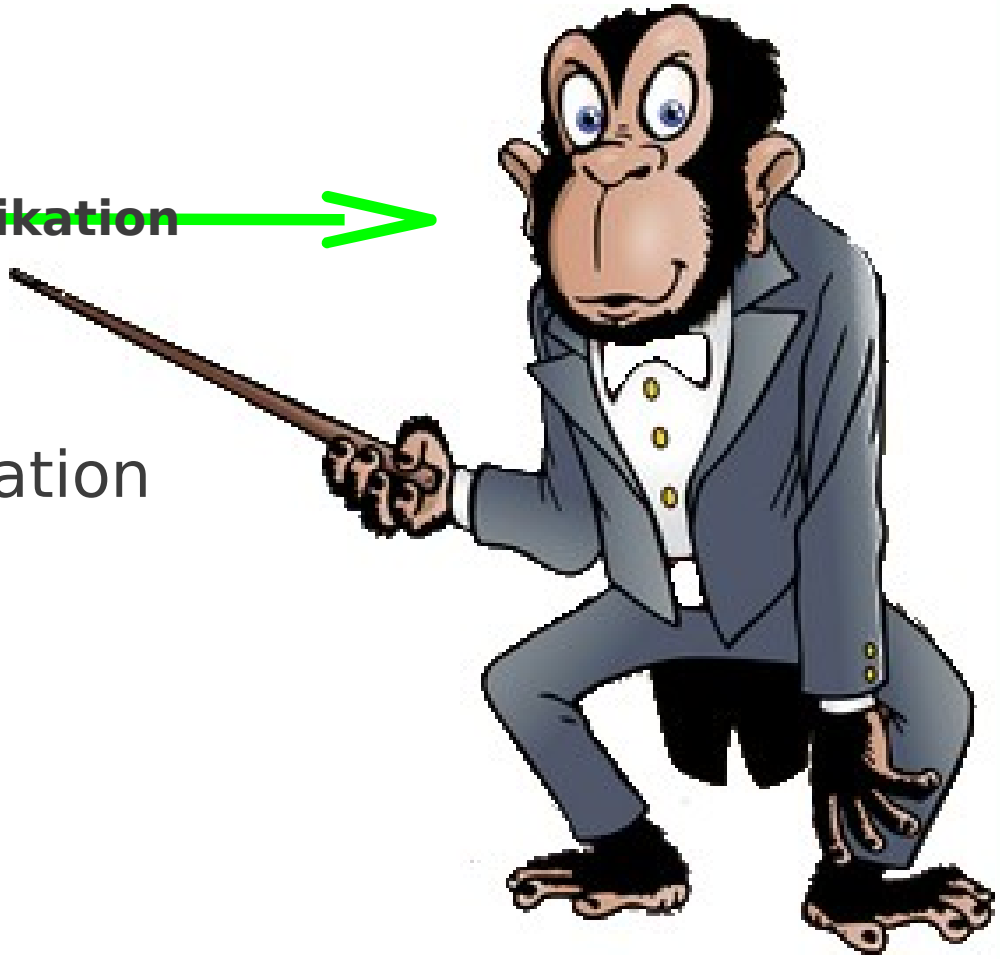
Entwickler

Fachexperte



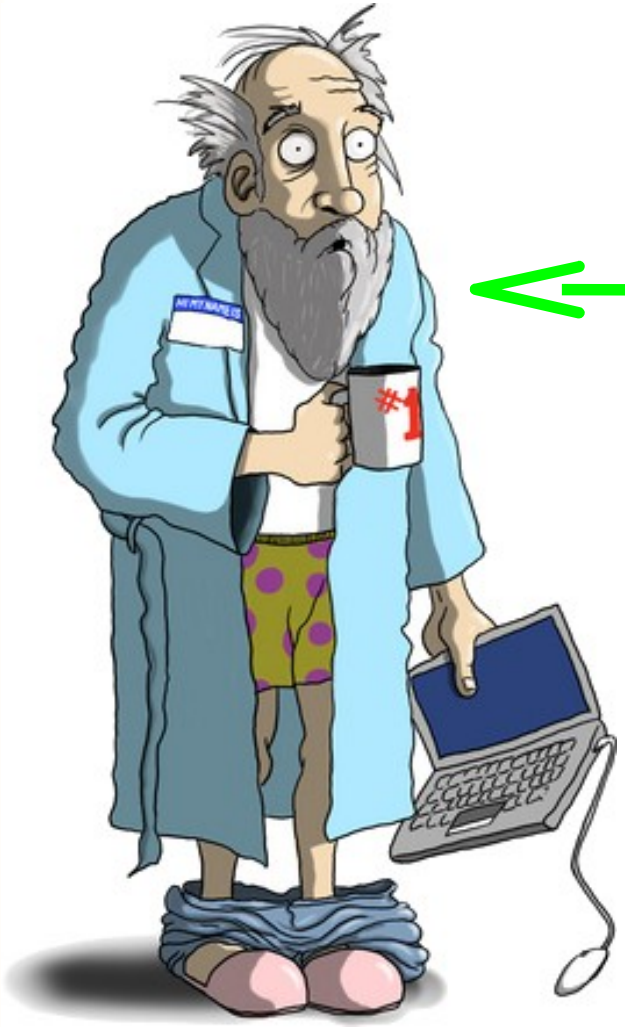
Kommunikation

Verifikation



Entwickler

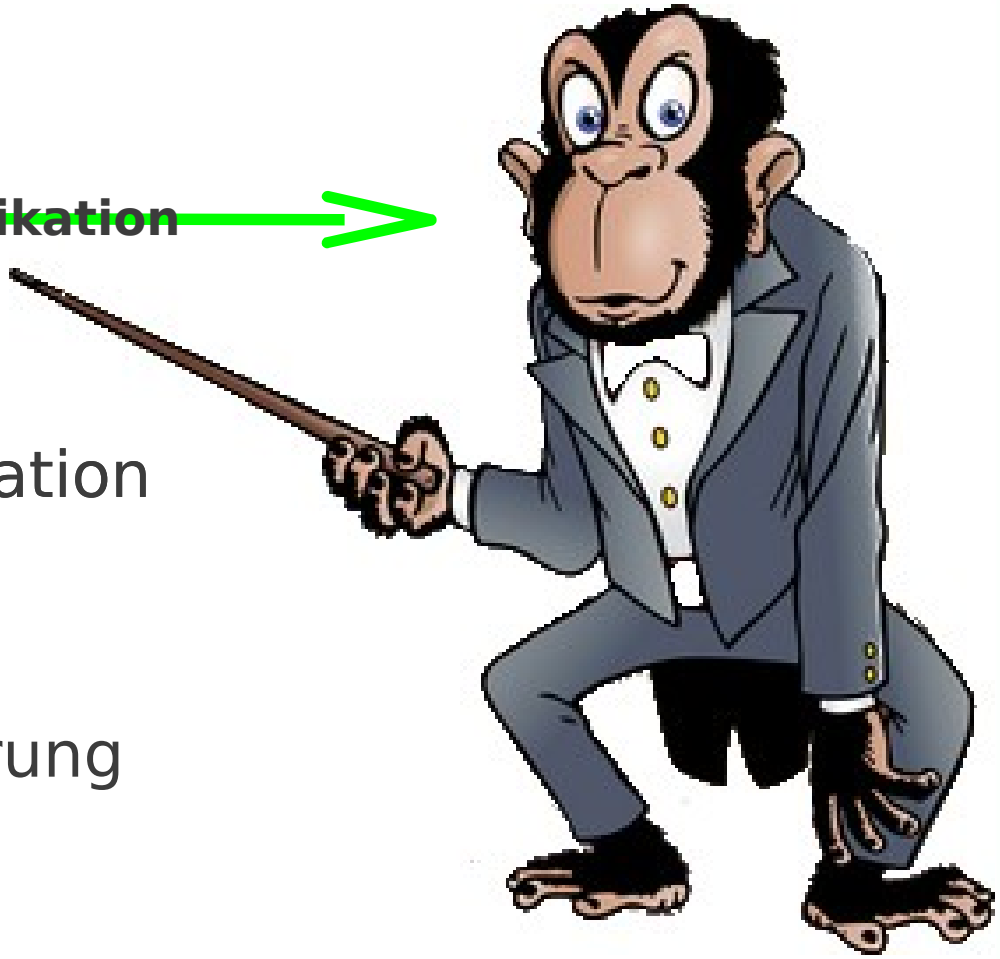
Fachexperte



Kommunikation

Verifikation

Änderung



Entwickler

Fachexperte

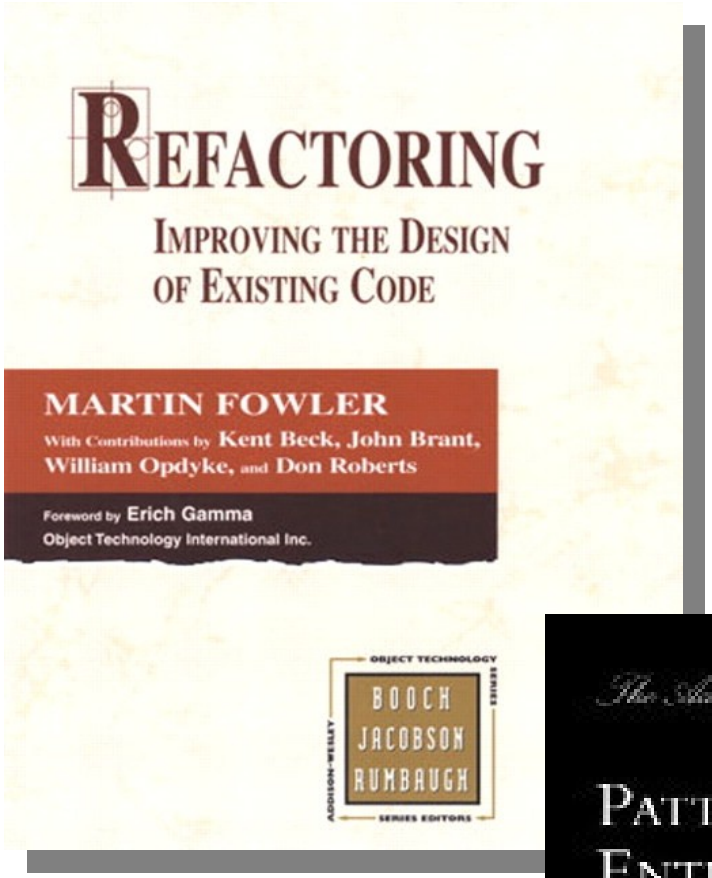
Produktivität

Warum Nicht?

Mehraufwand

DSL Kategorien

Martin Fowler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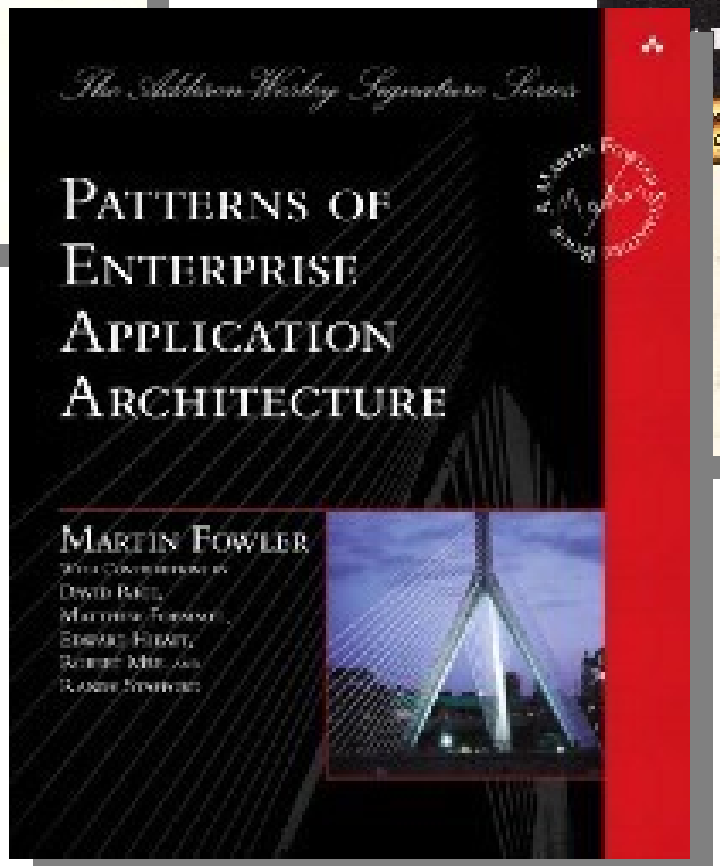
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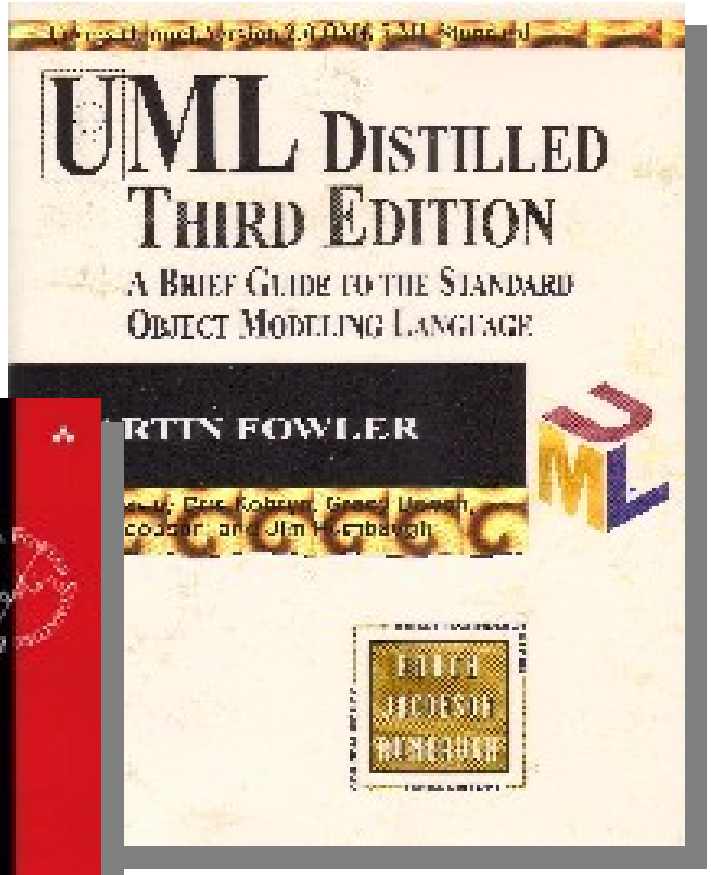
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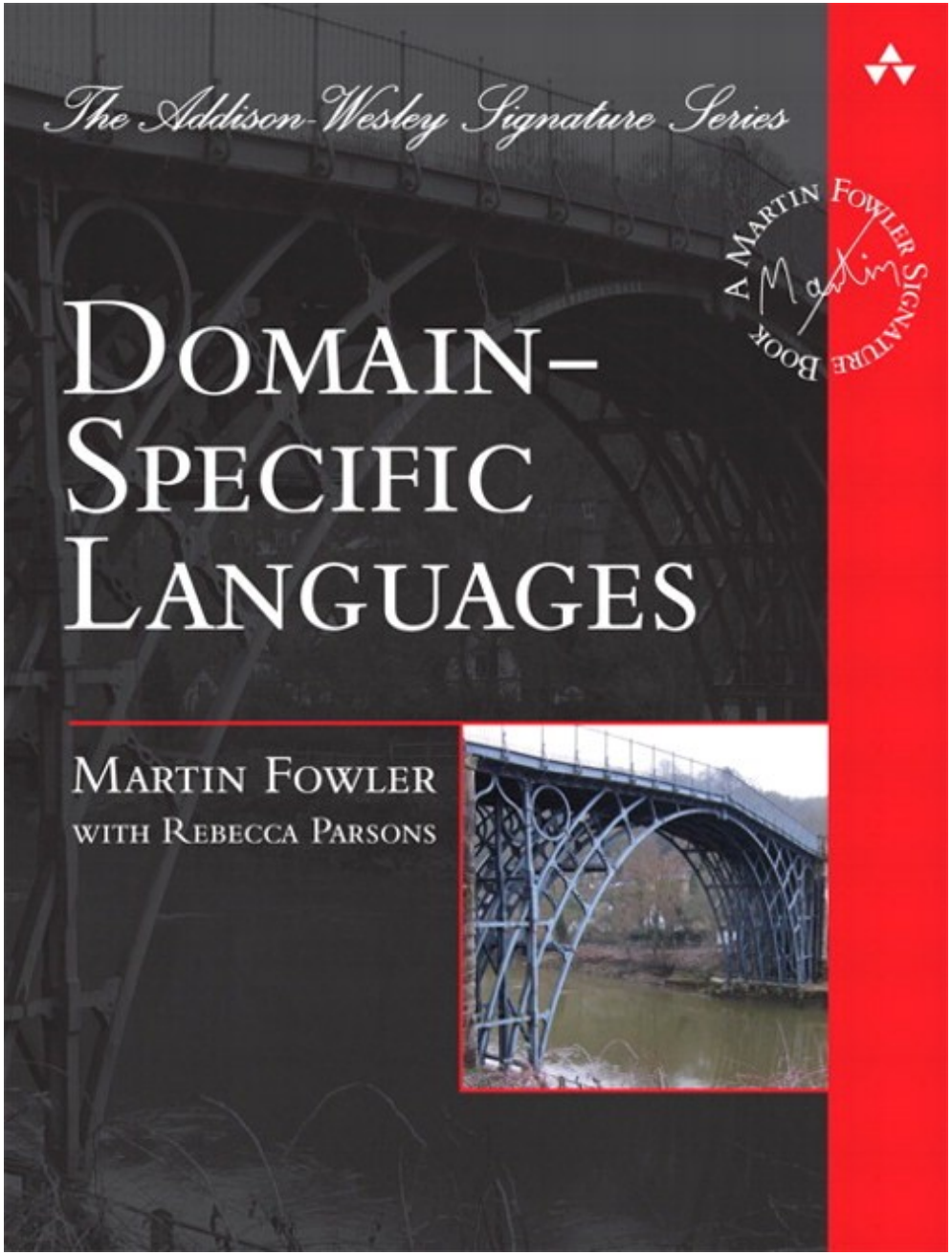
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Martin Fowler
with Rebecca Parsons

Interne DSL

Externe DSL

Extern

Völlig frei in der Syntax

Extern

Völlig frei in der Syntax

Parser benötigt


```
Cave Dragon

  Image: swamp_drake

  Rules:
    Flying
    <b>Flame Attack</b> - 36 sec: Mass Attack to Front
    <b>Scale Growth</b> - 36 sec, 2 Iron: +1 Armor (3 charges)
    <i>... Cave Dragons eat iron to strengthen their scales</i>

  Attributes:
    attack      3
    armor       1
    health     15
    stone_cost  2
    gold_cost   2
    power       2


  Actions:
    play                9
    fly                12
    attack             24

    flame_attack       36, target_area: card.area_in_front_of

    scale_growth (direct) 36, 3 charges
      icon: reinforce_armor
      formula: armor += 1,
      show only in field,
      costs: 2 iron

  Tags: dragon, unit, organic, combat
```

Intern

Benötigt keinen eigenen Parser

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Benutzt Host-Sprache,

z.B. Ruby, LISP, Java, C#

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Gebunden an die Syntax der Host-Sprache

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Benötigt keinen eigenen Parser

Benutzt Host-Sprache,

z.B. Ruby, LISP, Java, C#

Gebunden an die Syntax der Host-Sprache

Profitiert von Sprachen mit syntaktischen Freiheiten, z.B. LISP, Ruby


```
def_card 'Cave Dragon' do

  image 'swamp_drake'

  rules %{
    Flying
    <b>Flame Attack</b> - 36 sec: Mass Attack to Front
    <b>Scale Growth</b> - 36 sec, 2 Iron: +1 Armor (3 charges)
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  }

  attributes {
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    armor        1
    health      15
    stone_cost   2
    gold_cost    2
    power        2
  }

  actions {
    play                9
    fly                12
    attack             24

    flame_attack       36, target_area: 'car[illegible]of'

    scale_growth :direct, 36,
      icon: 'reinforce_armor',
      num_charges: 3,
      formula: 'card[:armor] ||= 0; card[:armor] += 1',
      show_only_in: 'field',
      costs: [[:iron, 2]]
  }

  tags :dragon, :unit, :organic, :combat

end
```

Extern

- Vorteile
  - exakt an die Fachdomäne angepasst
  - keine fremden Syntaxelemente
- Nachteile
  - Parser notwendig
  - Oft aufwendig und komplex (Parserbau)

Intern

- Nachteile
  - Syntax der Hostsprache, je nach Hostsprache
- Vorteile
  - vergleichsweise einfach, kein Parserbau!
  - Nutzung von IDE / Tooling: Syntax-Highlighting, Syntax-Check, ...

Fazit

Interne DSLs sind ein guter Kompromiss

Fazit

Interne DSLs sind ein guter Kompromiss

aus **Aufwand** und **Nutzen**

Interne DSLs in Ruby

DSL-Development

DSL-Development

- Language First Design

DSL-Development

- Language First Design
- Agiles Vorgehen

Agiles Vorgehen

- Durchstich durch alle Schichten
- Nur ein Teil der Features der DSL

Obie Fernandez: DSLs für Versicherungsverträge

Obie: Klassifizierung von Ruby-DSLs

- Instantiation
- Class Macros
- Top-Level Methods

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- Instantiation
- Class Macros
- **Top-Level Methods**

```
def_card 'Cave Dragon' do

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    <i>... Cave Dragons eat iron to strengthen their scales</i>
  }

  attributes {
    attack      3
    armor       1
    health     15
    stone_cost  2
    gold_cost   2
    power       2
  }

  actions {
    play               9
    fly               12
    attack            24

    flame_attack      36, target_area: 'card.area_in_front_of'

    scale_growth :direct, 36,
      icon: 'reinforce_armor',
      num_charges: 3,
      formula: 'card[:armor] ||= 0; card[:armor] += 1',
      show_only_in: 'field',
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  }

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  }

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```
def_card 'Cave Dragon' do

  image 'swamp_drake'

  attributes {
    attack        3
    armor         1
    health       15
    stone_cost    2
    gold_cost     2
    power         2
  }

end
```

```
def_card 'Cave Dragon' do

end
```

```
module Game

  module CardBuilderDsl

    def def_card(name, &block)
    …
    end

  end

end

include Game::CardBuilderDsl
```

```
module Game

  module CardBuilderDsl

    def def_card(name, &block)
    …
    end

  end

end

include Game::CardBuilderDsl
```

Modul/Package - Organisation

```
module Game

  module CardBuilderDsl

    def def_card(name, &block)
    …
    end

  end

end

include Game::CardBuilderDsl
```

Zieht Methodendefinition in den Kernel

```
def def_card(name, &block)
…
end
```

```
def_card 'Cave Dragon' do

end
```

```
def def_card(name, &block)
…
end
```

```
def_card('Cave Dragon')
```

Optionale Klammern

```
def def_card(name, &block)
…
end
```

```
def_card 'Cave Dragon' do

end
```

```
def def_card(name, &block)
…
end
```

```
def_card 'Cave Dragon' do

end
```

```
def def_card(name, &block)
…
end
```

```
def_card 'Cave Dragon' do
  image 'swamp_drake'

  attributes {
    attack        3
    ...
    power         2
  }

end
```

```
def_card 'Cave Dragon' do

  image 'swamp_drake'

  attributes {
    attack        3
    armor         1
    health       15
    stone_cost    2
    gold_cost     2
    power         2
  }

end
```

&block

```
module Game
  module CardBuilderDsl
    def def_card(name, &block)
      …
    end
  end
end
include Game::CardBuilderDsl
```

```
def def_card(name, &block)
  ...
end
```

'Cave Dragon'

```
def def_card(name, &block)
  ...
end
```

'Cave Dragon'

```
image 'swamp_drake'

attributes {
  attack       3
  armor        1
  health      15
  stone_cost   2
  gold_cost    2
  power        2
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```
def def_card(name, &block)

  ...

end
```

```
'Cave Dragon'
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image 'swamp_drake'

attributes {
  attack       3
  armor        1
  health      15
  stone_cost   2
  gold_cost    2
  power        2
}
```

```
def def_card(name, &block)
  card = Card.new(name)
  …

end
```

```
module Game

  class Card
  …
  end

end
```

'Cave Dragon'

```
image 'swamp_drake'

attributes {
  attack       3
  armor        1
  health      15
  stone_cost   2
  gold_cost    2
  power        2
}
```

```
def def_card(name, &block)
  card = Card.new(name)
  …
  CardRepository.register card
end
```

```
module Game

  class Card
  …
  end

end
```

```
'Cave Dragon'
```

```
image 'swamp_drake'

attributes {
  attack       3
  armor        1
  health      15
  stone_cost   2
  gold_cost    2
  power        2
}
```

```
def def_card(name, &block)
  card = Card.new(name)
  block.call
  CardRepository.register card
end
```

```
module Game

  class Card
  …
  end

end
```

'Cave Dragon'

```
image 'swamp_drake'

attributes {
  attack       3
  armor        1
  health      15
  stone_cost   2
  gold_cost    2
  power        2
}
```

```
def def_card(name, &block)
  card = Card.new(name)
  block.bind(card).call
  CardRepository.register card
end
```

```
module Game

  class Card
  …
  end

end
```

'Cave Dragon'

```
image 'swamp_drake'

attributes {
  attack       3
  armor        1
  health      15
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def def_card(name, &block)
  card = Card.new(name)
  block.bind(card).call
  CardRepository.register card
end
```

```
module Game

  class Card
  …
  end

end
```

'Cave Dragon'

```
card = Card.new(name)
block.bind(card).call
```

```
class Card

  def initialize(name)
    @name = name
  end

end
```

```
card = Card.new(name)
block.bind(card).call
```

```
image 'swamp_drake'

attributes {
  attack       3
  armor        1
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  stone_cost   2
  gold_cost    2
  power        2
}
```

```
class Card

  def initialize(name)
    @name = name
  end

  def image(image_name)

  end

  def attributes(&block)

  end

end
```

```
card = Card.new(name)
block.bind(card).call
```

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image 'swamp_drake'

attributes {
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class Card

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  end

  def image(image_name)

  end

  def attributes(&block)

  end

end
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image 'swamp_drake'

attributes {
  attack      3
  armor       1
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  gold_cost   2
  power       2
}
```

```
card = Card.new(name)
block.bind(card).call
```

```
class Card

  def initialize(name)
    @name = name
  end

  def image(image_name)
    @image_name = image_name
  end

  def attributes(&block)

  end

end
```

```
image 'swamp_drake'

attributes {
  attack       3
  armor        1
  health      15
  stone_cost   2
  gold_cost    2
  power        2
}
```

```
card = Card.new(name)
block.bind(card).call
```

```
class Card

  def initialize(name)
    @name = name
  end

  def image(image_name)
    @image_name = image_name
  end

  def attributes(&block)
    ab = AttributesBuilder.new
    block.bind(ab).call
    @stored_attributes = ab.attributes
  end
```

```
attributes {
  attack       3
  armor        1
  health      15
  stone_cost   2
  gold_cost    2
  power        2
}
```

```ruby
def attributes(&block)
  ab = AttributesBuilder.new
  block.bind(ab).call
  @stored_attributes = ab.attributes
end
```

```
attributes {
  attack       3
  armor        1
  health      15
  stone_cost   2
  gold_cost    2
  power        2
}
```

```ruby
def attributes(&block)
  ab = AttributesBuilder.new
  block.bind(ab).call
  @stored_attributes = ab.attributes
end
```

```
def attributes(&block)
  ab = AttributesBuilder.new
  block.bind(ab).call
  @stored_attributes = ab.attributes
end
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```
attributes {
  attack       3
  armor        1
  health      15
  stone_cost   2
  gold_cost    2
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```
attributes {
  attack        3
  armor         1
  health       15
  stone_cost    2
  gold_cost     2
  power         2
}
```

```ruby
def attributes(&block)
  ab = AttributesBuilder.new
  block.bind(ab).call
  @stored_attributes = ab.attributes
end
```

```ruby
class AttributesBuilder

end
```

```
attack       3
armor        1
health      15
stone_cost   2
gold_cost    2
power        2
```

```ruby
def attributes(&block)
  ab = AttributesBuilder.new
  block.bind(ab).call
  @stored_attributes = ab.attributes
end
```

```ruby
class AttributesBuilder

  def initialize

  end

  def method_missing(method, value)

  end

end
```

```
def attributes(&block)
  ab = AttributesBuilder.new
  block.bind(ab).call
  @stored_attributes = ab.attributes
end
```

```
attack       3
armor        1
health      15
stone_cost   2
gold_cost    2
power        2
```

```
class AttributesBuilder

  def initialize

  end

  def method_missing(method, value)

  end

end
```

```
def attributes(&block)
  ab = AttributesBuilder.new
  block.bind(ab).call
  @stored_attributes = ab.attributes
end
```

```
attack       3
armor        1
health      15
stone_cost   2
gold_cost    2
power        2
```

```
class AttributesBuilder


  def initialize
    @attributes = {}
  end

  def method_missing(method, value)
    attr_name = method
    @attributes[attr_name] = value
  end

end
```

```
attack       3
armor        1
health      15
stone_cost   2
gold_cost    2
power        2
```

```ruby
def attributes(&block)
  ab = AttributesBuilder.new
  block.bind(ab).call
  @stored_attributes = ab.attributes
end
```

```ruby
class AttributesBuilder
  attr_reader :attributes

  def initialize
    @attributes = {}
  end

  def method_missing(method, value)
    attr_name = method
    @attributes[attr_name] = value
  end

end
```

```ruby
module Game

  module CardBuilderDsl

    def def_card(name, &block)
      card = Card.new(name)
      block.bind(card).call
      CardRepository.register card
    end

  end

end

include Game::CardBuilderDsl
```

```ruby
module Game

  class Card
    def initialize(name)
      @name = name
    end

    def image(image_name)
      @image_name = image_name
    end

    def attributes(&block)
      ab = AttributesBuilder.new
      block.bind(ab).call
      @stored_attributes = ab.attributes
    end
  end

  class AttributesBuilder
    attr_reader :attributes

    def initialize
      @attributes = {}
    end

    def method_missing(method, value)
      attr_name = method
      @attributes[attr_name] = value
    end

  end

end
```

Geringer Mehraufwand

```
def_card 'Cave Dragon' do

  image 'swamp_drake'

  attributes {
    attack       3
    armor        1
    health      15
    stone_cost   2
    gold_cost    2
    power        2
  }

end
```

```
def_card 'Cave Dragon' do

  image 'swamp_drake'

  rules %{
    Flying
    <b>Flame Attack</b> - 36 sec: Mass Attack to Front
    <b>Scale Growth</b> - 36 sec, 2 Iron: +1 Armor (3 charges)
    <i>... Cave Dragons eat iron to strengthen their scales</i>
  }

  tags :dragon, :unit, :organic, :combat

  attributes {
    attack      3
    armor       1
    health     15
    stone_cost  2
    gold_cost   2
    power       2
  }

  actions {
    play               9
    fly               12
    attack            24

    flame_attack      36, target_area: 'card.area_in_front_of'

    scale_growth :direct, 36,
      icon: 'reinforce_armor',
      num_charges: 3,
      formula: 'card[:armor] ||= 0; card[:armor] += 1',
      show_only_in: 'field',
      costs: [[:iron, 2]]
  }

end
```


```
def_card 'Cave Dragon' do

  image 'swamp_drake'

  rules %{
    Flying
    <b>Flame Attack</b> - 36 sec: Mass Attack to Front
    <b>Scale Growth</b> - 36 sec, 2 Iron: +1 Armor (3 charges)
    <i>... Cave Dragons eat iron to strengthen their scales</i>
  }

  tags :dragon, :unit, :organic, :combat

  attributes {
    attack       3
    armor        1
    health      15
    stone_cost   2
    gold_cost    2
    power        2
  }

  actions {
    play                9
    fly                12
    attack             24

    flame_attack       36, target_area: 'card.area_in_front_of'

    scale_growth :direct, 36,
      icon: 'reinforce_armor',
      num_charges: 3,
      formula: 'card[:armor] ||= 0; card[:armor] += 1',
      show_only_in: 'field',
      costs: [[:iron, 2]]
  }

end
```

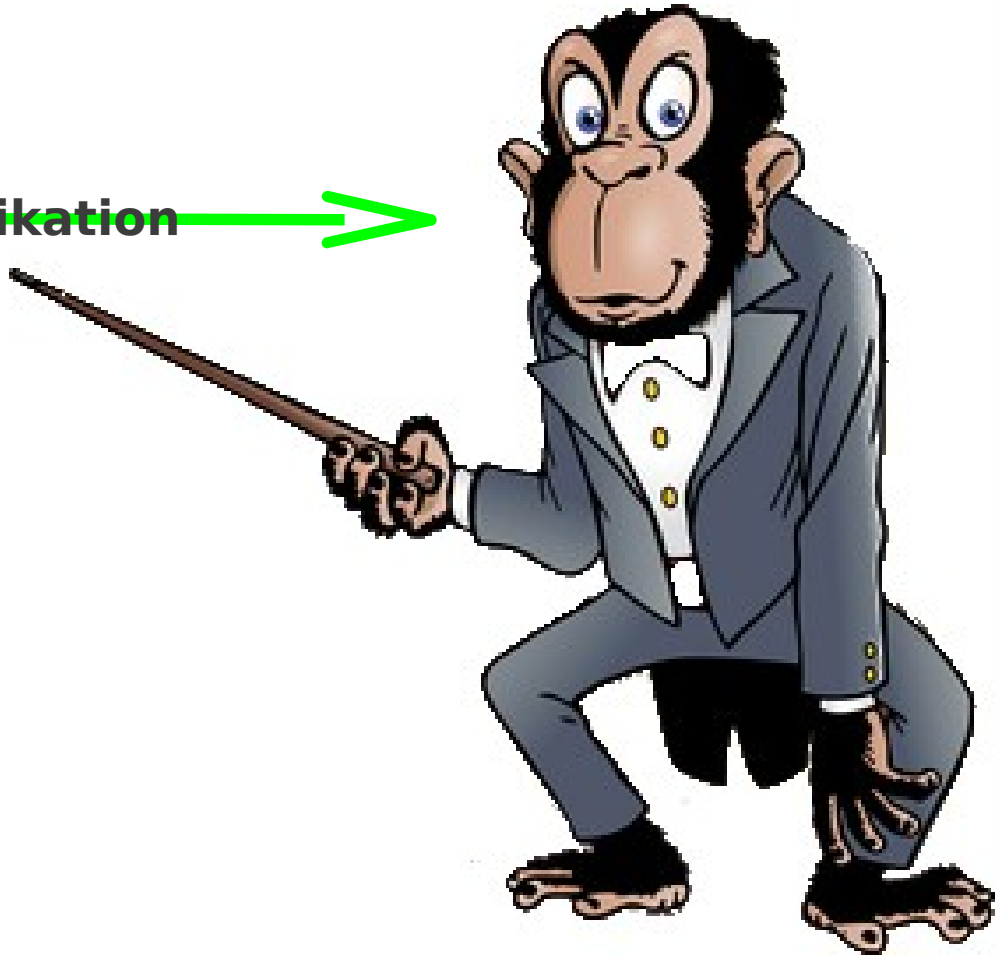
Ruby-DSLs leiden nur geringfügig unter der Host-Syntax


```
dragon = Card.new('Cave Dragon', 'swamp_drake')

dragon.rules = %{
    Flying
    <b>Flame Attack</b> - 36 sec: Mass Attack to Front
    <b>Scale Growth</b> - 36 sec, 2 Iron: +1 Armor (3 charges)
    <i> … Cave Dragons eat iron to strengthen their scales</i>
}

dragon.add_tag(Tag.new('dragon'))
dragon.add_tag(Tag.new('unit'))
dragon.add_tag(Tag.new('organic'))
dragon.add_tag(Tag.new('combat'))

dragon.attributes = AttributeContainer.new
dragon.attributes['attack']= Attribute::Base.new(3)
dragon.attributes['armor'] = Attribute::Armor.new(1)
dragon.attributes['health']= Attribute::Health.new(1)
…[3 Zeilen gekürzt]

play = ActionBase::Play.new('play', 9)
dragon.add_action(play)

fly = ActionBase::Fly.new('fly', 9)
dragon.add_action(fly)

attack = ActionBase::Attack.new('attack', 24)
dragon.add_action(attack)

flame_attack = ActionBase::MassAttack('flame', 36)
flame_attack.target_area = Card.area_in_front_of
dragon.add_action(flame_attack)

scale_growth = ActionBase::Direct('scale_growth', 36)
scale_growth.icon = 'reinforce_armor'
scale_growth.num_charges = 3,
scale_growth.show_only_in = 'field'
scale_growth.costs = [Cost.new('iron', 2)]

def scale_growth.formula
  card[:armor] ||= 0
  card[:armor] += 1
end

dragon.add_action(scale_growth)
CardBuildersRepository.register(dragon)
```

DSL-Code deutlich lesbarer

Produktivität

Kommunikation



Entwickler

Fachexperte

Lust auf eigene Experimente?

Weiterführende Links

http://martinfowler.com/bliki/DomainSpecificLanguage.html

http://martinfowler.com/bliki/DslQandA.html

http://www.infoq.com/presentations/agile-dsl-development-in-ruby

http://blog.jayfields.com/2008/02/implementing-internal-dsl-in-ruby.html

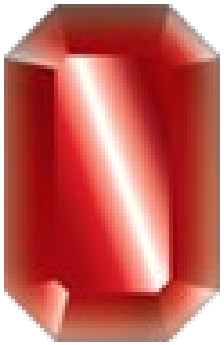
https://github.com/bobsh/puppet-rubydsl-examples

http://www.artima.com/weblogs/viewpost.jsp?thread=251945

http://www.khelll.com/blog/ruby/ruby-and-internal-dsls/

http://www.infoq.com/news/2007/06/dsl-or-not

JRuby



IronRuby

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