

Scala

Lightweight Modular Staging

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Now that we are familiar with Scala...



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lets look at an awesome library implemented in Scala.



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Lightweight Modular Staging (LMS)



LMS is..

'A library-based multi-stage programming approach that uses types to distinguish between binding time.'



Outline

- ▶ A gentle introduction to LMS
- ▶ Generative Programming
- ▶ Language virtualization
- ▶ Intermediate representation
- ▶ How do we program in LMS?



A gentle introduction to LMS

Power function in Scala

```
def power(b: Double, x: Int): Double =  
  if (x == 0) 1.0 else b * power(b, x - 1)
```

Power function in Scala LMS

```
trait PowerA { this: Arith =>  
  def power(b: Rep[Double], x: Int): Rep[Double] =  
    if (x == 0) 1.0 else b * power(b, x - 1)  
}
```



A gentle introduction to LMS

What did we just see?

- ▶ T versus `Rep[T]`
- ▶ `def` versus `trait`



Generative Programming

What is generative programming?



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Generative Programming

Commonalities of LMS and generative programming



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Generative Programming

Differences of LMS and generative programming



Language Virtualization



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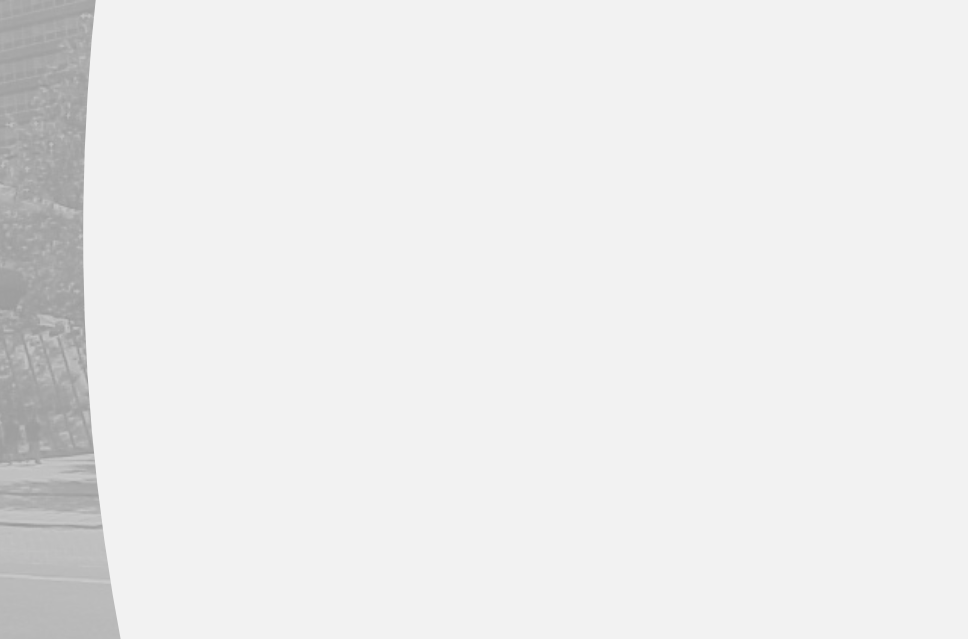
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Intermediate representation



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