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Literate

Example

The Design

Next Steps

Literate Scientific Software

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Overview

Literate Scientific Software

2 LSS Today: Building on our Previous Example

3 The Current Framework Design

4 Next Steps



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Next Step

Literate Scientific Software

- Motivation
 - Improve verifiability, maintainability and reusability.
 - Save money and time
- One "source," multiple views
 - Requirements
 - Design
 - Test Cases
 - Build instructions
 - ...



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Recap

Last time:

- Took a look at a simple example from a project involving a fuel pin.
- Discussed the challenges of managing change throughout the software documentation.
- Proposed encapsulating all of the requisite knowledge in one source composed of "chunks".



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Example: h_g and h_c

A simple example taken from the SRS for FP

SRS



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Example: h_g and h_c The source

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The current source consists of:

- 1 The recipe
- 2 Common knowledge (chunks)
- 3 Specific knowledge (chunks)



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Example

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Example: h_g and h_c

```
srsBody = Document ((S "SRS for ") :+:
    (N \ h_g \ ^. \ symbol) :+:
    (S " and ") :+: (N $ h_c ^. symbol))
    (S "Spencer Smith") [s1,s2]
s1 = Section (S "Table of Units")
    [s1_intro, s1_table]
s1_table = Table [S "Symbol", S "Description"] $ mkTable
    [(\xspace x -> Sy (x ^. unit)).
    (\x -> S (x ^. descr))
    1 si_units
s1_intro = Paragraph (S "Throughout this ...
```

. . .



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Example

Example: h_a and h_c Common Knowledge

```
kelvin, mole, ampere, candela ::
                                                            FundUnit
metre, kilogram, second,
         = fund "Metre"
                            "length (metre)"
                                                            "m"
metre
kilogram = fund "Kilogram"
                            "mass (kilogram)"
                                                            "kg"
second
         = fund "Second"
                            "time (second)"
                                                            "s"
                                                            "K"
kelvin
         = fund "Kelvin"
                            "temperature (kelvin)"
                            "amount of substance (mole)"
mole
         = fund "Mole"
                                                            "mol"
         = fund "Ampere"
                            "electric current (ampere)"
                                                            "A"
ampere
candela
         = fund "Candela"
                            "luminous intensity (candela)"
                                                            "cd"
```



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Next Step

Example: h_g and h_c Specific Knowledge

```
h_c_eq :: Expr
h_c_eq = ((Int 2):*(C k_c):*(C h_b)) :/
      ((Int 2):*(C k_c) :+ ((C tau_c):*(C h_b)))

h_c :: EqChunk
h_c = EC (UC (VC "h_c"
      "convective heat transfer coefficient
            between clad and coolant"
      (sub h c) ) heat_transfer) h_c_eq
```



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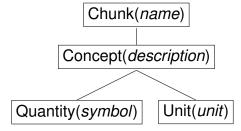
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Framework Design Chunks





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Framework Design Recipes

Micro-layout language:

- subscripts
- superscripts
- concatenation



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Framework Design Recipes

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Next Steps

Macro-layout language:

- Document
- Section
- Paragraph
- Equation
- Table
- . . .



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Next Steps

Framework Design Benefits

- Zero knowledge duplication
- 2 Traceability



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Next Steps

Next Steps

What next?

- Generate the rest of the example.
- Finish implementing different document "views".
 - Ex. SRS with/without derivations.
- Implement additional document types.
- · Generate the source code.
- Implement more examples.



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Next Steps

Thank You!