Objects and Relations in Scrall Scrapbook

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Wed Jul 01 2015

This document is a collection of figures used to illustrate
the above titled blog post published on modeling-languages.com

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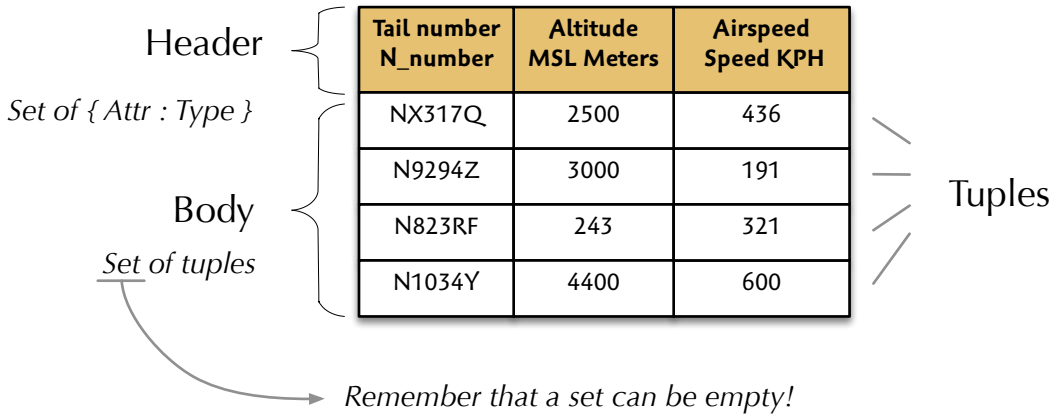
A relation (value)



Tail number N_number	Altitude MSL Meters	Airspeed Speed KPH
NX317Q	2500	436
N9294Z	3000	191
N823RF	243	321
N1034Y	4400	600

Airspeed Speed KPH	Tail number N_number	Altitude MSL Meters
321	N823RF	243
600	N1034Y	4400
436	NX317Q	2500
191	N9294Z	3000

This value is equivalent to the one above.

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Example scenario

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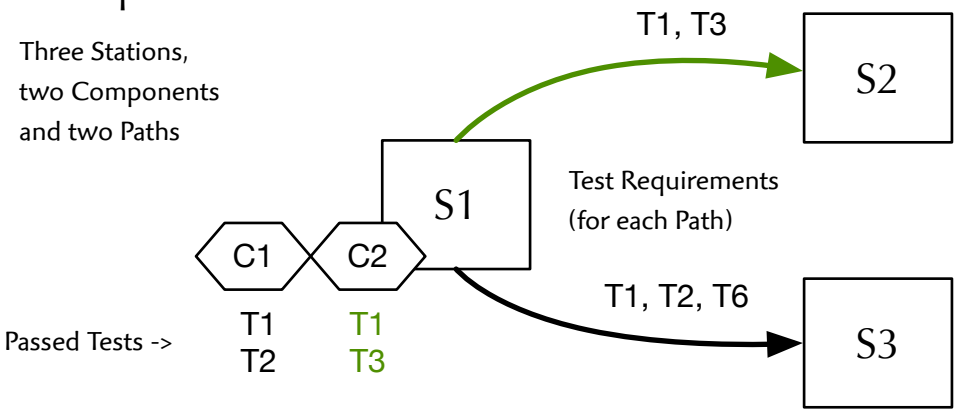
Three Stations,
two Components
and two Paths



Component C1 cannot take either Path,
but C2 may proceed to Station S2
now that it has completed T3.

Components

ID	Location
C1	S1
C2	S1

Passed Tests

Component	Test	Station
C1	T1	S1
C1	T2	S1
C2	T1	S1
C2	T3	S1

Paths

From station	To station
S1	S2
S1	S3

Test Requirements

Test	From station	To station
T1	S1	S2
T1	S1	S3
T3	S1	S2
T6	S1	S3
T2	S1	S3

Tests

Name	Location
T1	S1
T2	S1
T6	S1
T3	S1

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Component Testing Example

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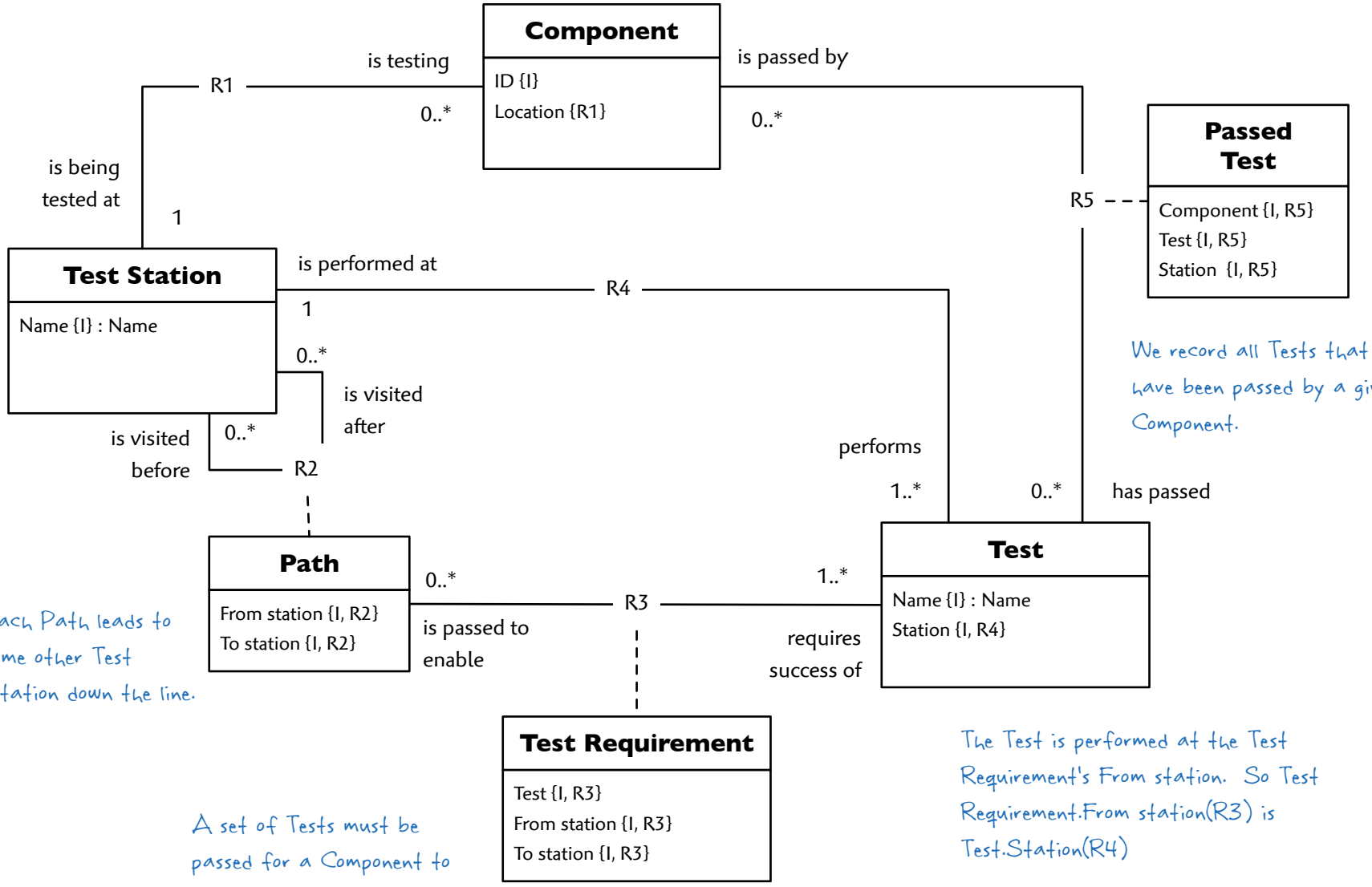
A Component is some kind of physical equipment that is going to be tested. Its Location is whatever Test Station where it happens to be at the moment.



We record all Tests that have been passed by a given Component.

Each Path leads to some other Test Station down the line.

A set of Tests must be passed for a Component to proceed along a given Path.

The Test is performed at the Test Requirement's From station. So Test Requirement.From station(R3) is Test.Station(R4)

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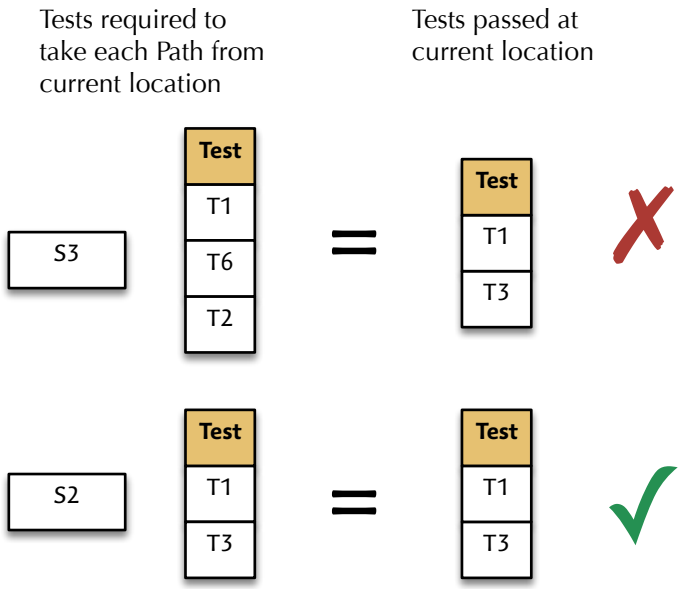
Objective: Perform these comparisons without using a loop



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The relational EXTEND operation

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Flying Aircraft

Tail number N_number	Altitude MSL Meters	Airspeed Speed KPH	Fuel Quantity Weight_kg	Model Name
NX317Q	2500	436	16200	777-300ER
N9294Z	3000	191	2	Cessna 150
N823RF	243	321	28200	A333
N1034Y	4400	600	51000	747-400

Heading and a few other likely attributes are omitted so I can squeeze all this into your browser.

Aircraft Spec

Name Name	WIngspan Meters	Burn Rate Kgph
777-300ER	64.8	8100
A333	63.7	6000
747-400	64	11100
Cessna 150	10	2.72

For this exercise, we're going with a greatly simplified formula for calculating remaining flight time.

.

Extend with this attribute::type

Compute this value

```
Planes to land soon #= Flying Aircraft #[Max flight time::Duration]:[ Fuel quantity / (/Aircraft Spec.Burn rate)] \
  (Max flight time < Critical duration).(Tail number, Remaining flight time)
```

Return these tuples only

and only these attributes

Planes to land soon

Assuming the scalar variable Critical duration was initialized to 3 hrs, the returned relation is...

Tail number N_number	Max flight time Duration_hr
NX317Q	2
N9294Z	.74

The class model itself is never modified! All relational operations are local to the current activity.

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The relational IMAGE operation

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Components

ID	Location
C1	S1
C2	S1

Passed Tests

Component	Test	Station
C1	T1	S1
C1	T2	S1
C2	T1	S1
C2	T3	S1

For each ID value in the Components relation, get its image in the Passed Tests relation.

ID
C1
C2

Qty passed

Image of C1

Test	Station
T1	S1
T2	S1

Image of C2

Test	Station
T1	S1
T3	S1

The image includes data related to the supplied tuple, but **excludes** the attribute used to produce the image.

```
Num tests passed #= Component.Component@ID #[Qty passed][#(#!!Passed Tests)]
```

For each tuple in this relation

Extend relation to the left with this renamed attribute

Take the quantity of the image of each tuple in this relation

Num tests passed

Component	Qty passed
C1	2
C2	2

The IMAGE operation is generally used as part of an EXTEND operation when the extra attribute value must be computed based on multiple tuples.

ID must be renamed to Component to get the image in Passed Tests.

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Step 1: Grab tests passed at the current location

```
passed here #= /Passed Test( Component: ID, Station: Location ).Test
```

You could have written my.ID and my.Location, but the 'my' is assumed.

Component

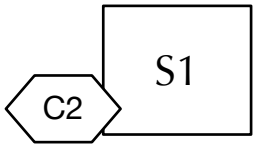
ID {I}
Location {R1}

Passed Tests

Component	Test	Station
C1	T1	S1
C1	T2	S1
C2	T1	S1
C2	T3	S1

passed here

Test
T1
T3



Assuming Component C2 is the object executing this activity while at Test Station S1.

Passed Test

Component {I, R5}
Test {I, R5}
Station {I, R5}

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Step 2: Grab Test Requirements to exit current location

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```
reqs out #= /Test Station/Test/Test Requirement( From station: Location ).(Test, To station )
```

Test Requirements

Test	From station	To station
T1	S1	S2
T1	S1	S3
T3	S1	S2
T6	S1	S3
T2	S1	S3

`reqs out`

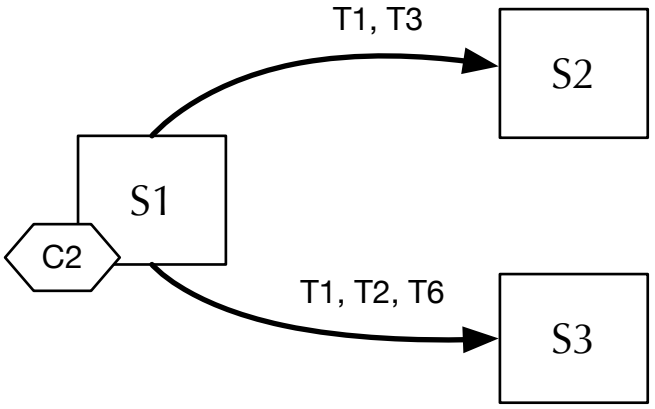
Test	To station
T1	S2
T1	S3
T3	S2
T6	S3
T2	S3

Component

ID {I}
Location {R1}

Test Requirement

Test {I, R3}
From station {I, R3}
To station {I, R3}



These tests must be passed to move forward to a 'To Station'.

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Step 3: Find the enabled Paths

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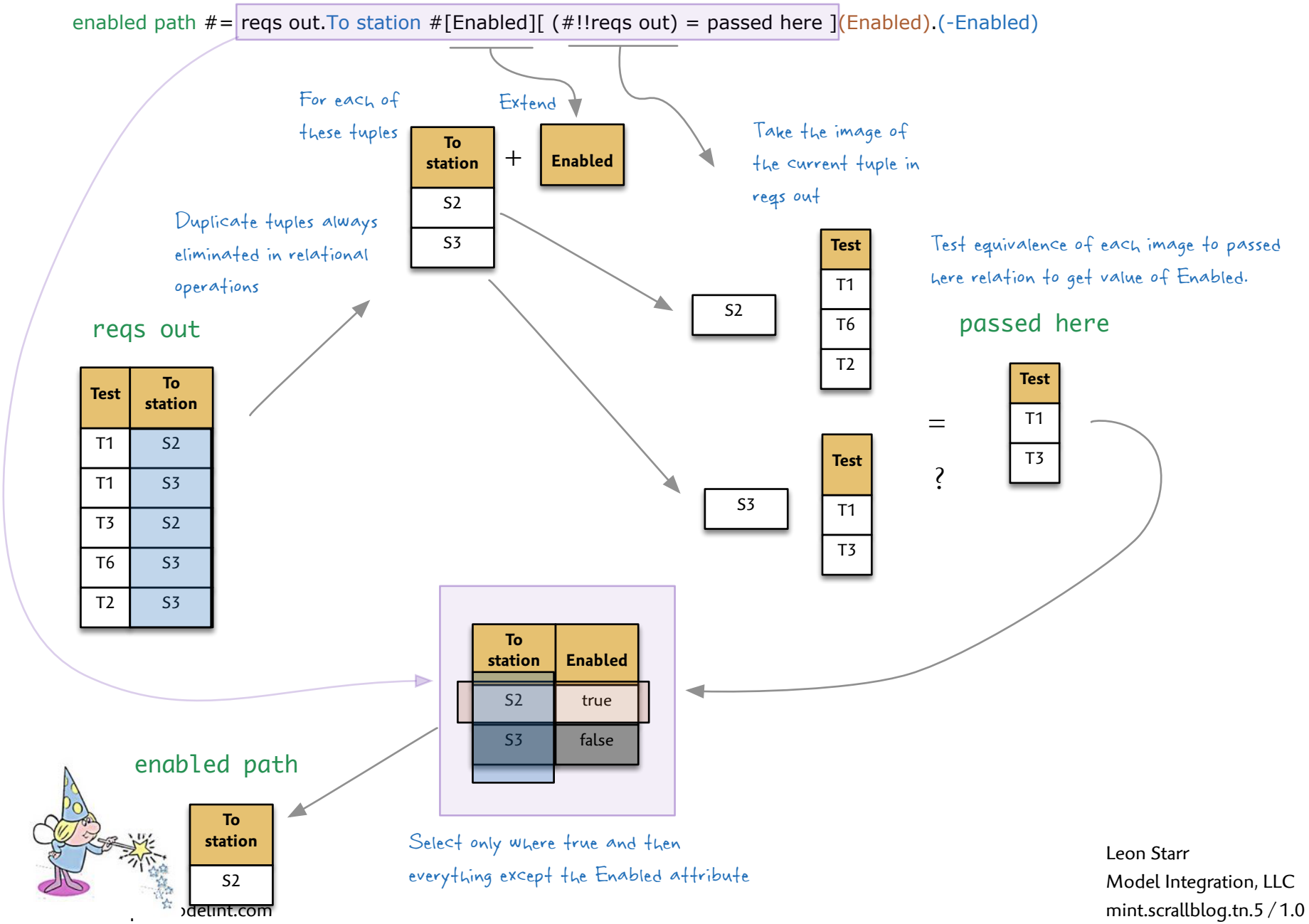

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