# Web Service Slicing and Service Evolution Analytics


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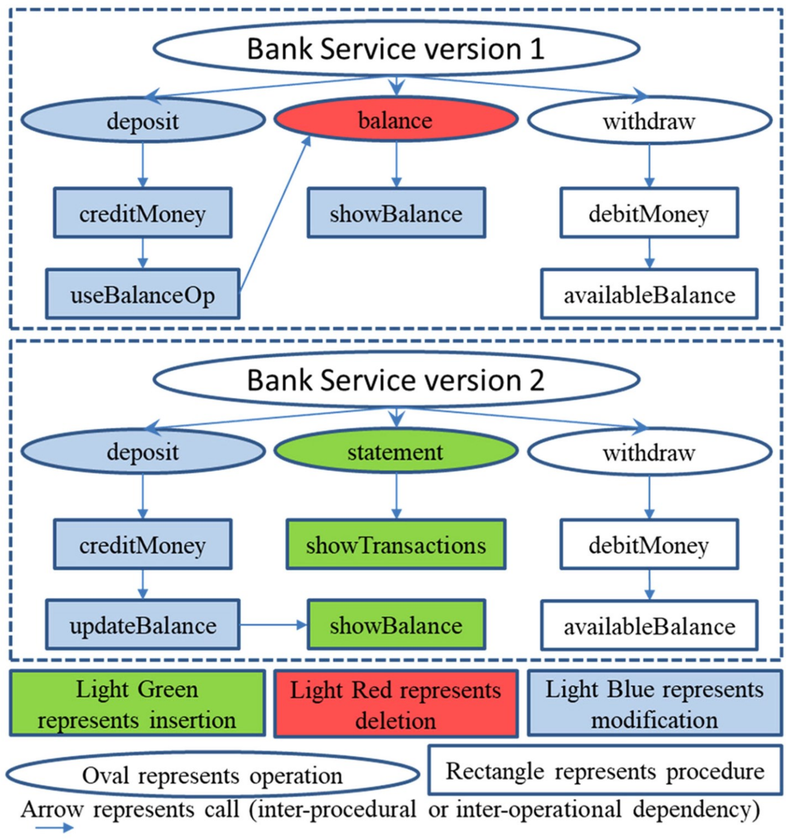
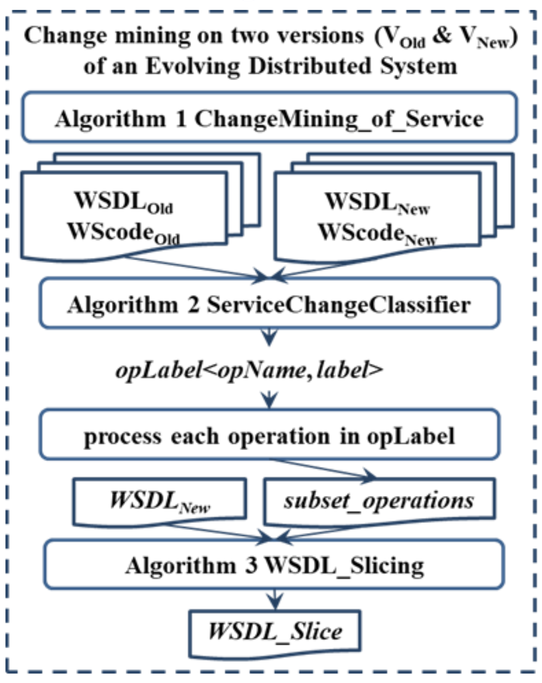
## Web Service Slicing

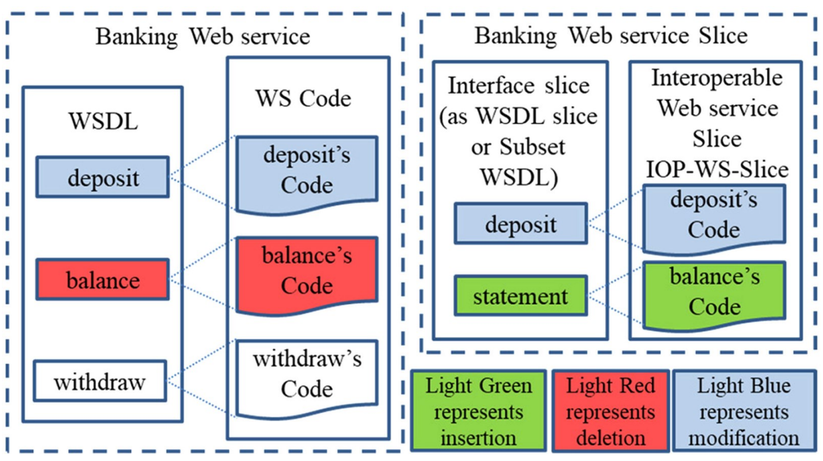



## WSDL Slice: Service Change Classification

**Subset WSDL** or **WSDL Slice**

Change analysis with a **service change classifier** algorithm to assign change labels to a service's operations and then extracts a **WSDL slice**.

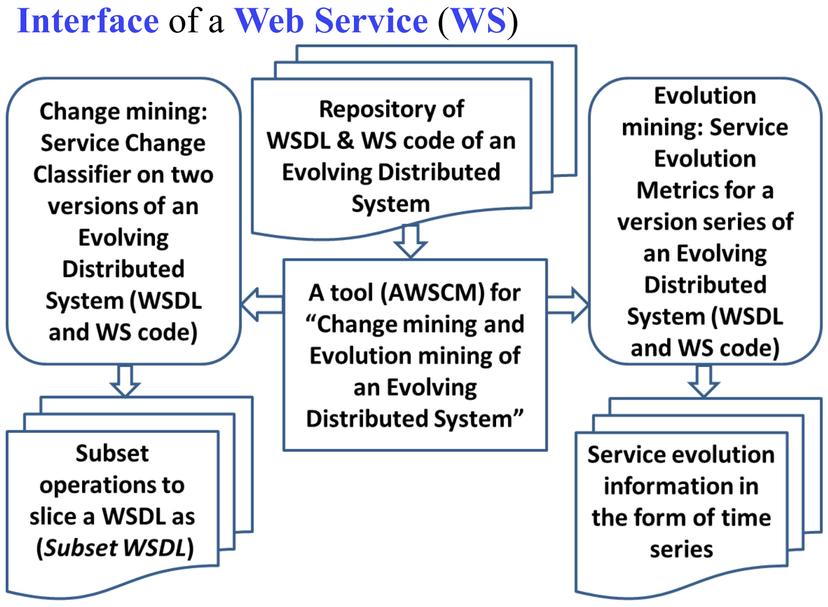


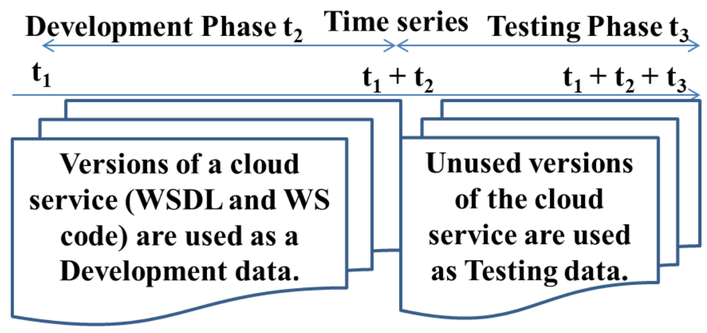




## AWSCM – A Tool

### Automated Web Service Change Management

Built an AWSCM tool that supports change and evolution mining of an evolving distributed system. **Web Services Description Language** (**WSDL**) is an **Interface** of a **Web Service** (**WS**)

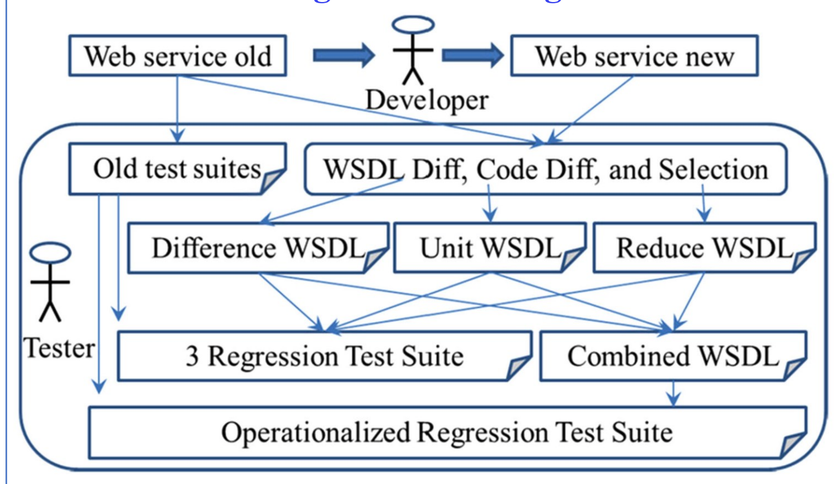


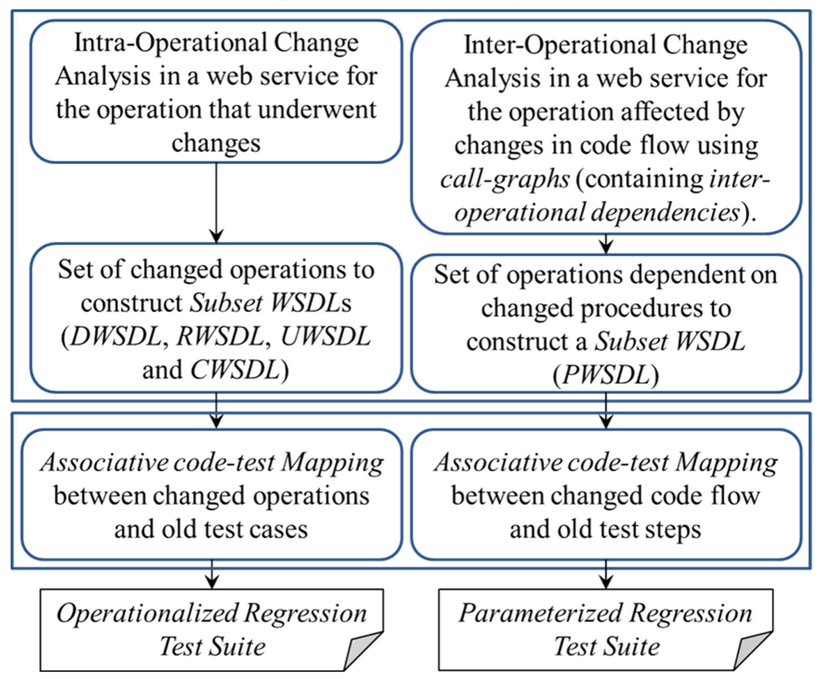

### Change mining of two versions: labeling

| Label of the change | Level | Purpose at location of change |
|---|---|---|
| Insertion $I_{WSDL}$ | WSDL | Insertion of an operation in WSDL or Datatype in XSD |
| Insertion $I_{WS\ Code}$ | WS Code | Insertion of code for new operation |
| Deletion $D_{WSDL}$ | WSDL | Deletion of operation from WSDL to make its disfunction to client |
| Deletion $D_{WS\ Code}$ | WS Code | Deletion of operation from WS code to make disfunction at WSDL |
| Modification $M_{WSDL}$ | WSDL | Modification of XSD |
| Modification $M_{WS\ Code}$ | WS Code | Modification at code lines without affecting WSDL |

## Subset WSDL: Regression Testing of Web Service




### Intra and Inter-Operational Analysis to Test Changes

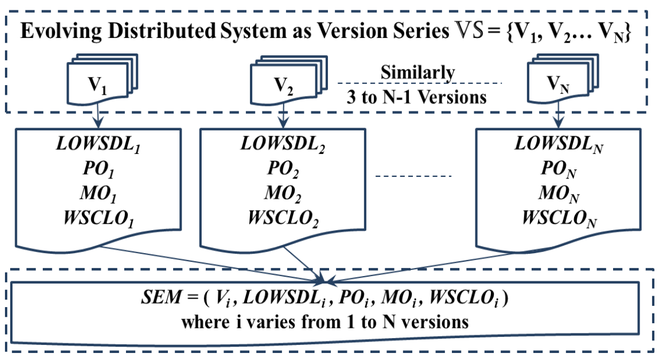



### White & Black Box Analysis of 8 Services

| Web service project | White Box Analysis | Black Box Analysis | Change source |
|---|---|---|---|
| *Eucalyptus* | Y | Y | GitHub |
| *SaaS* | Y | Y | Self-made |
| *BookService* | Y | Y | Self-made |
| *AWS* | Code is inaccessible | Y | Change analysis not performed |
| *Sunset Sunrise* | | Y | |
| *Bible* | | Y | |
| *Currency conversion* | | Y | |
| *Global weather* | | Y | |

| | | | |
|---|---|---|---|
| *AWS* | 3 out of 23 operations are selected leading to retrieving 3 out of 23 TC templates. | DWSDL has 3 Operation | 86.95% |
| *EucalyptusCC* | 2 operations are added leading to 2 out of 26 TC templates being retrieved. | DWSDL has 2 Operation | 92.31% |
| | 3 out of 26 WS code operations are changed leading to 3 out of 26 TC templates being retrieved. | UWSDL 3 has Operation | 88.5% |

## Service Evolution Analytics

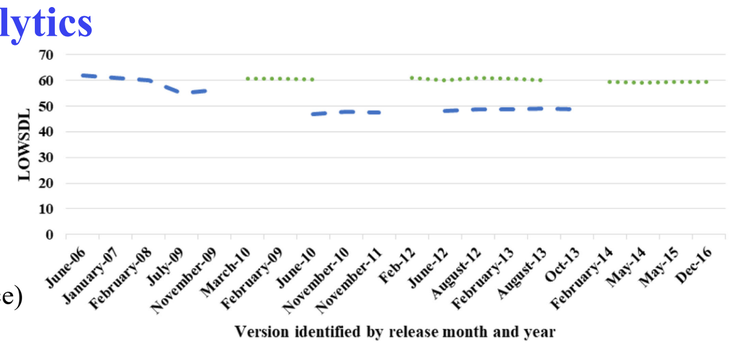


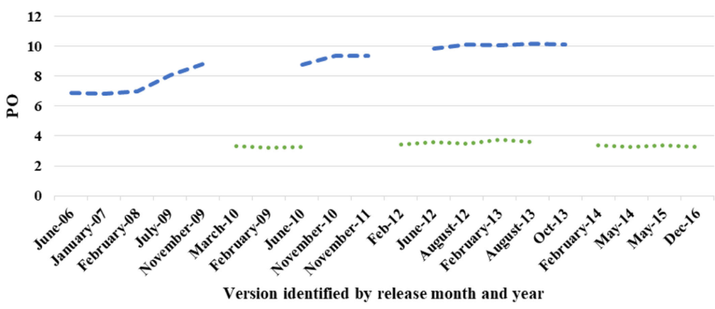

### Service Evolution Metrics

to study cloud service evolution
to deduce facts from a version series

### Analytics on Cloud Services

Evolution mining of a Version series
Evolution of Web Services
(Eucalyptus and Amazon Web Service)




**LOWSDL** = {($V_1$, $LOWSDL_1$)… ($V_i$, $LOWSDL_i$)… ($V_N$, $LOWSDL_N$)}

1. ***Lines per operation in the WSDL***

$$LOWSDL_i = \frac{Number\ of\ source\ lines\ in\ the\ WSDL\ for\ version\ i}{Number\ of\ operations\ in\ version\ i}$$

**PO** = {($V_1$, $PO_1$)… ($V_i$, $PO_i$)… ($V_N$, $PO_N$)}

2. ***Parameters per operation in the WSDL***

$$PO_i = \frac{Number\ of\ parameters\ in\ the\ WSDL\ for\ version\ i}{Number\ of\ operations\ for\ version\ i}$$

**MO** = {($V_1$, $MO_1$)… ($V_i$, $MO_i$)… ($V_N$, $MO_N$)}

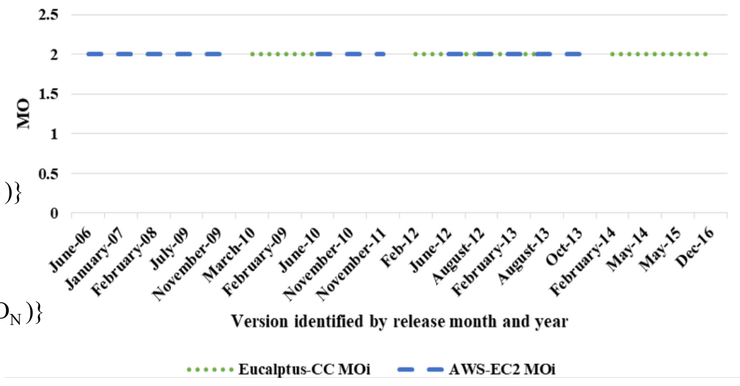
3. ***Messages per operation in the WSDL***

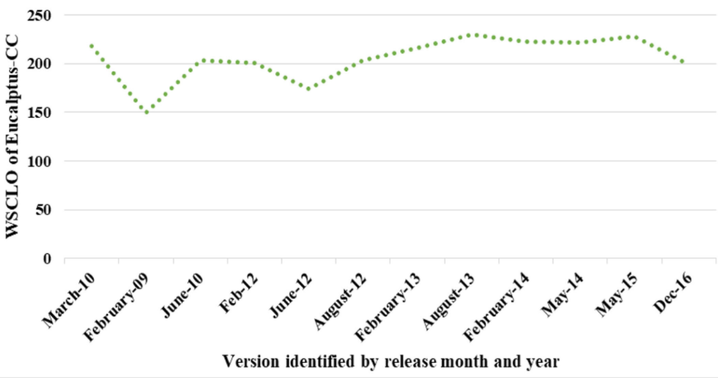
$$MO_i = \frac{Number\ of\ messages\ in\ the\ WSDL\ for\ version\ i}{Number\ of\ operations\ for\ version\ i}$$

**WSCLO** = {($V_1$, $WSCLO_1$)… ($V_i$, $WSCLO_i$)… ($V_N$, $WSCLO_N$)}

4. ***Code Lines per operation in the WS code***

$$WSCLO_i = \frac{Number\ of\ code\ lines\ of\ WS\ code\ in\ version\ i}{Number\ of\ operations\ in\ version\ i}$$





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