

# An Approach to Software Product Line Engineering

Ștefan Stănciulescu

IT University of Copenhagen

Software and Systems Section

5<sup>th</sup> May 2014

FOSD'14 Dagstuhl



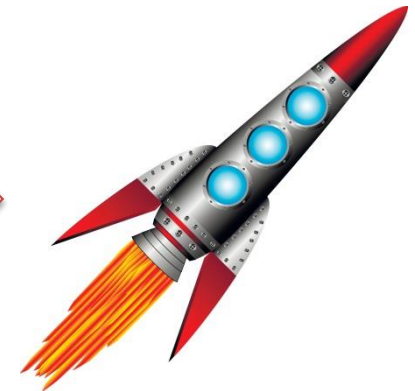
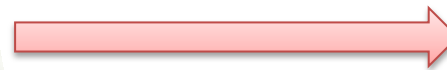
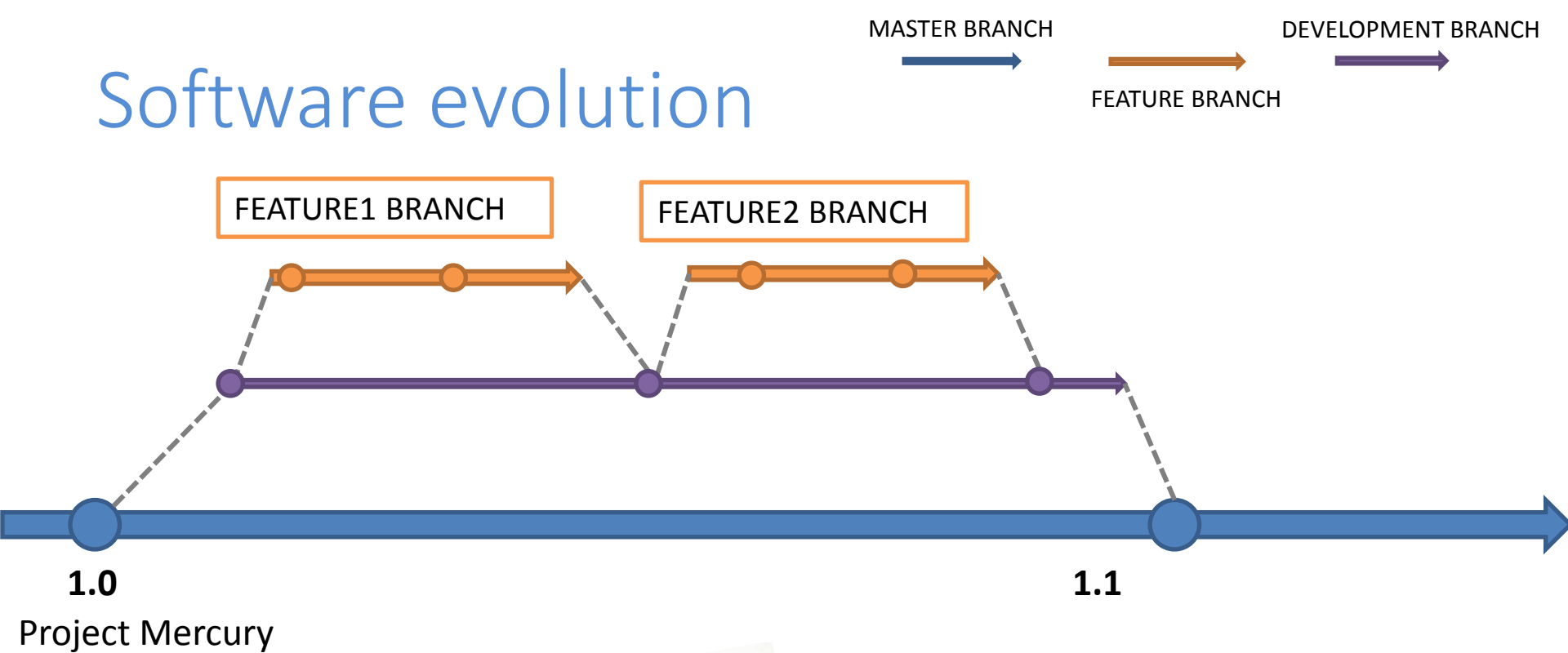
Joint work with

Krzysztof Czarnecki, Michael Antkiewicz, Thorsten Berger, Wenbin Ji  
(University of Waterloo)

Ina Schaefer, Sandro Schulze (TU Braunschweig)

Ralf Laemmel, Thomas Schmorleiz (TU Koblenz-Landau)

# Software evolution

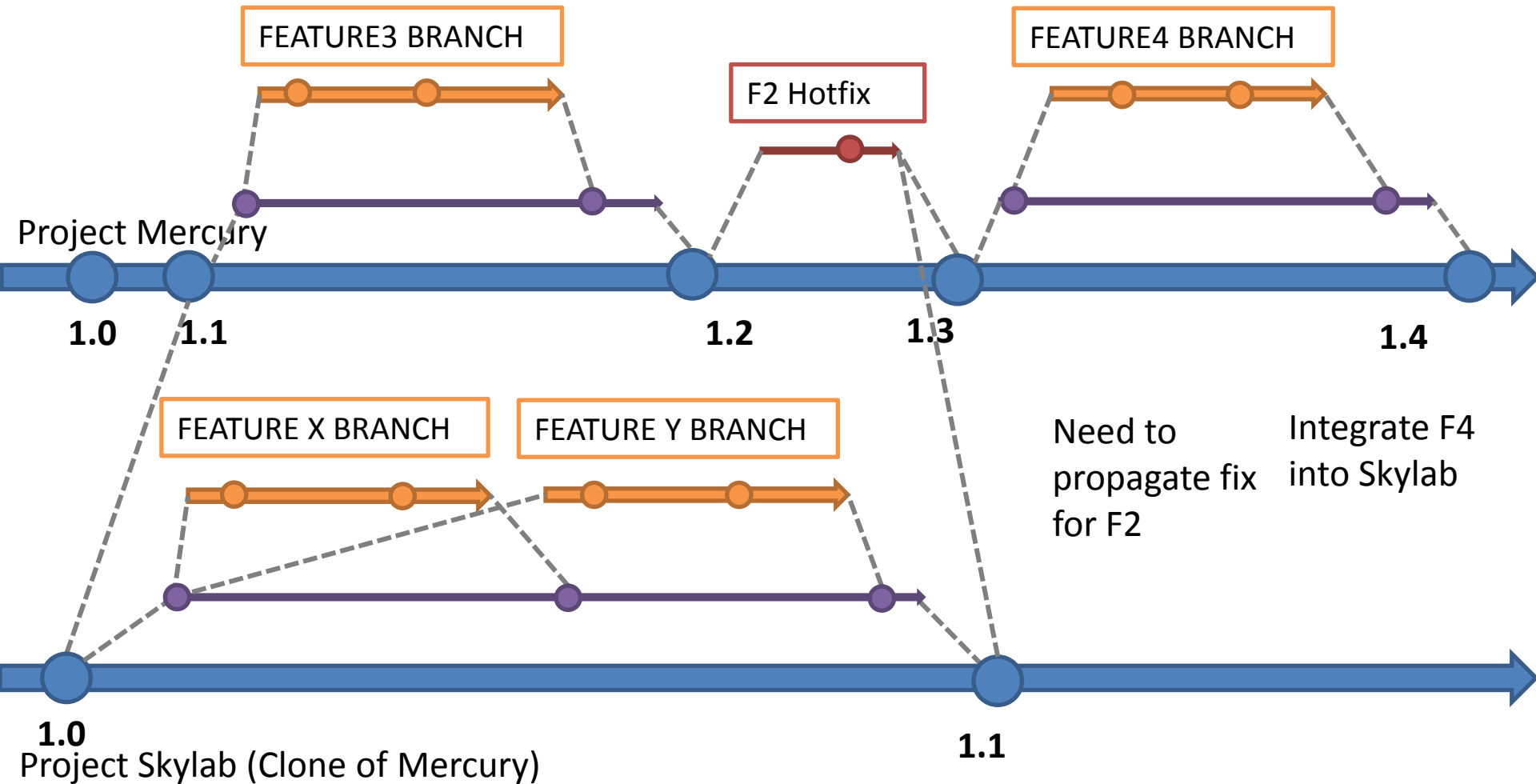


# Software evolution

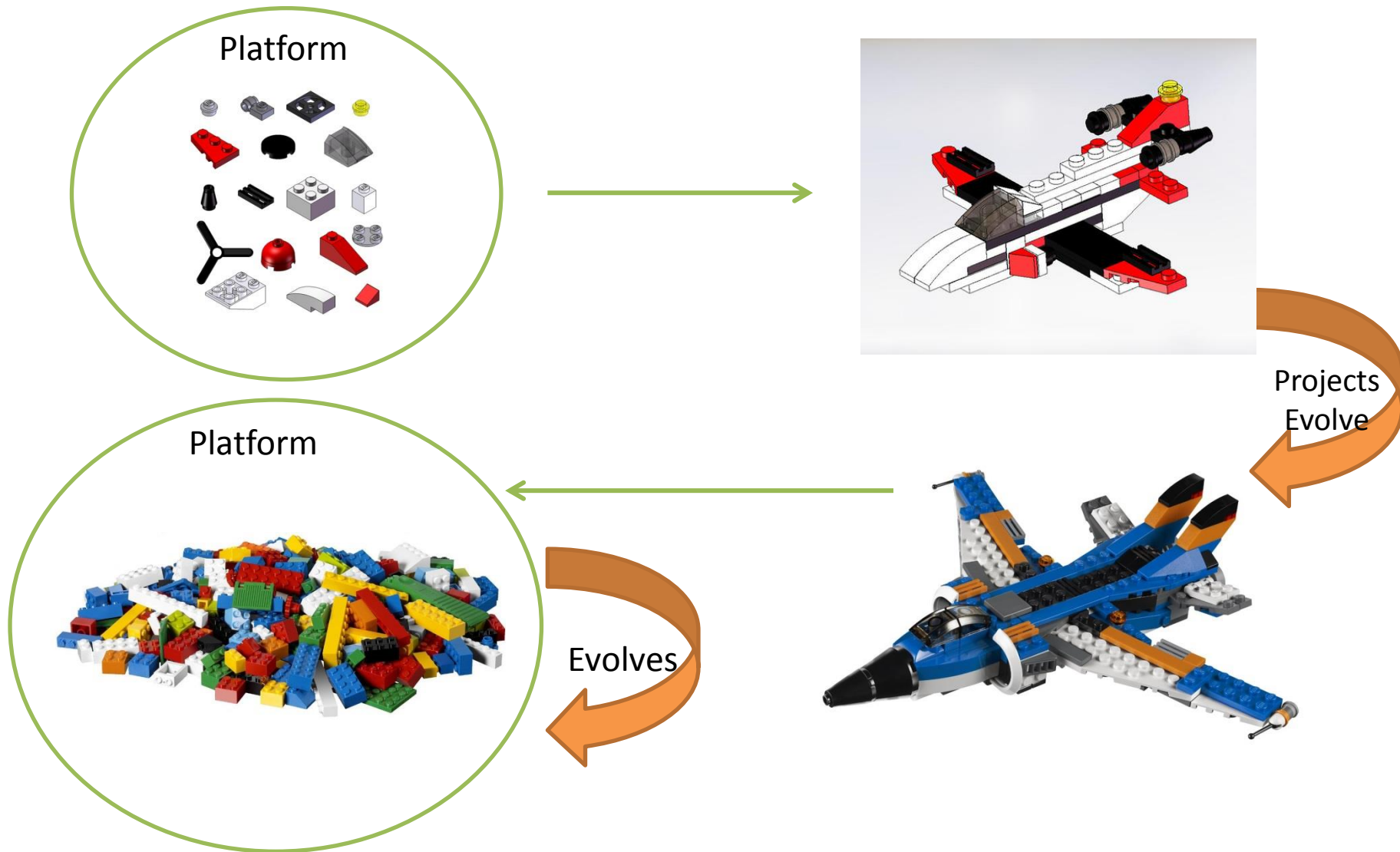
MASTER BRANCH

DEVELOPMENT BRANCH

FEATURE BRANCH



# Evolution in product lines



# Evolution in product lines



Clone it



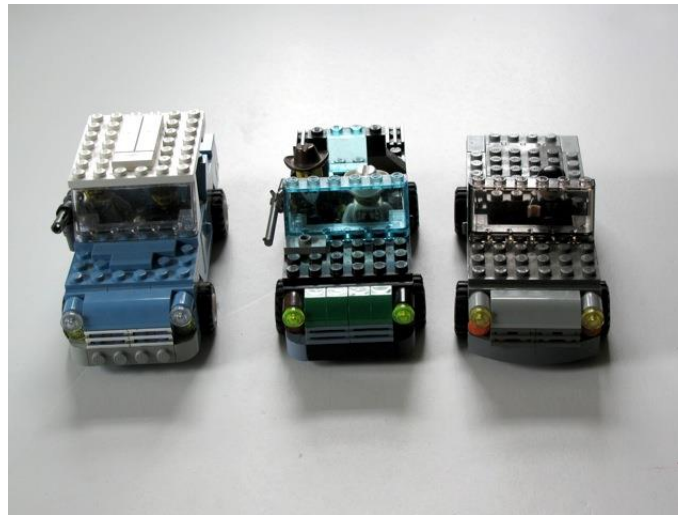
Modify it



# Evolution in product lines



Clone it



We have 3 projects,  
but 2 created using the  
clone-and-own

# Evolution in product line

## An Exploratory Study of Cloning in Industrial Software Product Lines

Yael Dubinsky\*, Julia Rubin\*†, Thorsten Berger‡§, Slawomir Duszynski¶, Martin Becker¶ and Krzysztof Czarnecki||

\*IBM Research in Haifa, Israel. Email: {dubinsky,mjulia}@il.ibm.com

†University of Toronto, Canada.

‡IT University of Copenhagen, Denmark. Email: thbe@itu.dk

§University of Leipzig, Germany.

¶Fraunhofer IESE, Germany. Email: {slawomir.duszynski,martin.becker}@iese.fraunhofer.de

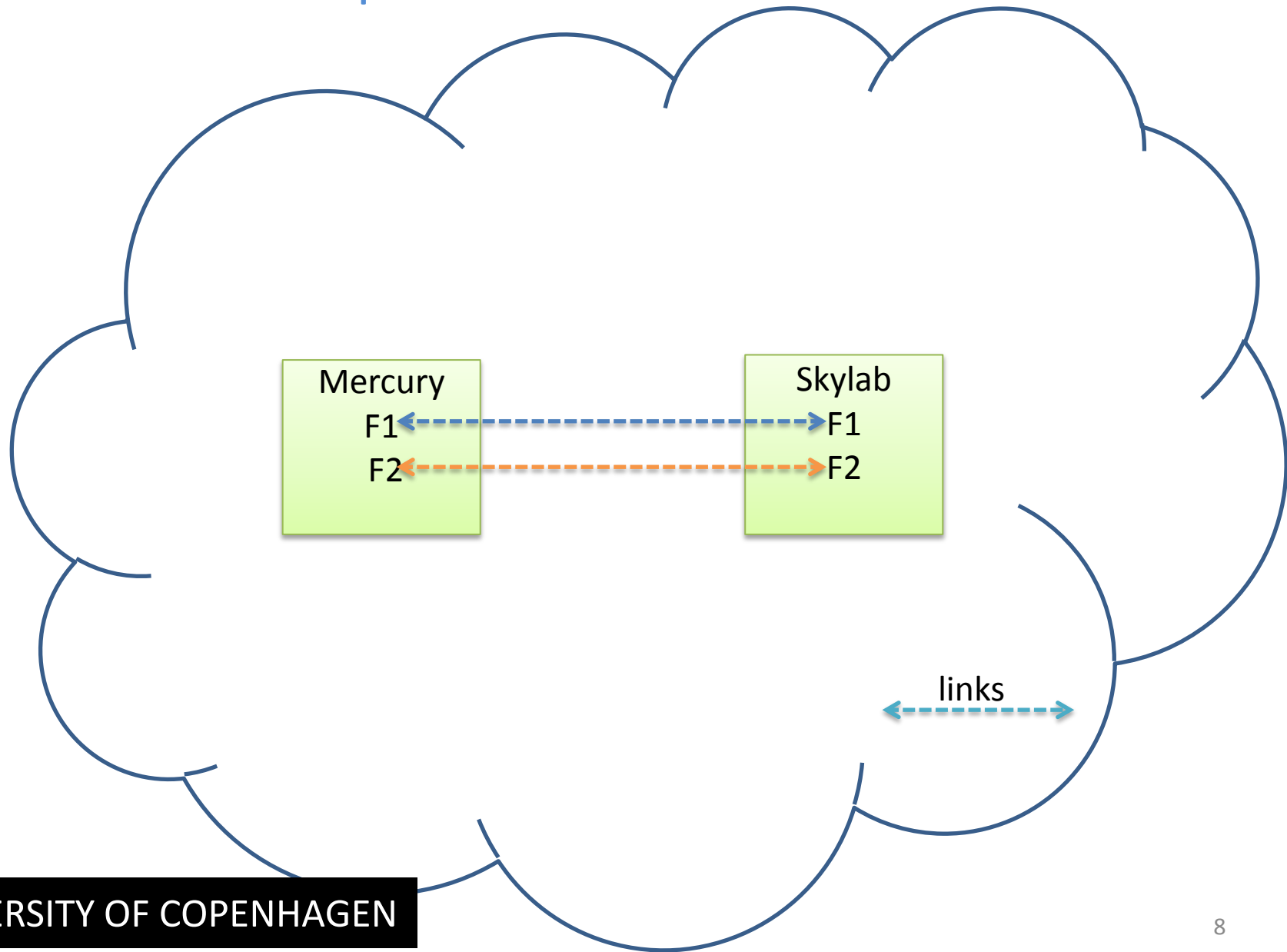
||University of Waterloo, Canada. Email: kczarnec@gsd.uwaterloo.ca

**Abstract**—Many companies develop software product lines—collections of similar products—by cloning and adapting ar-

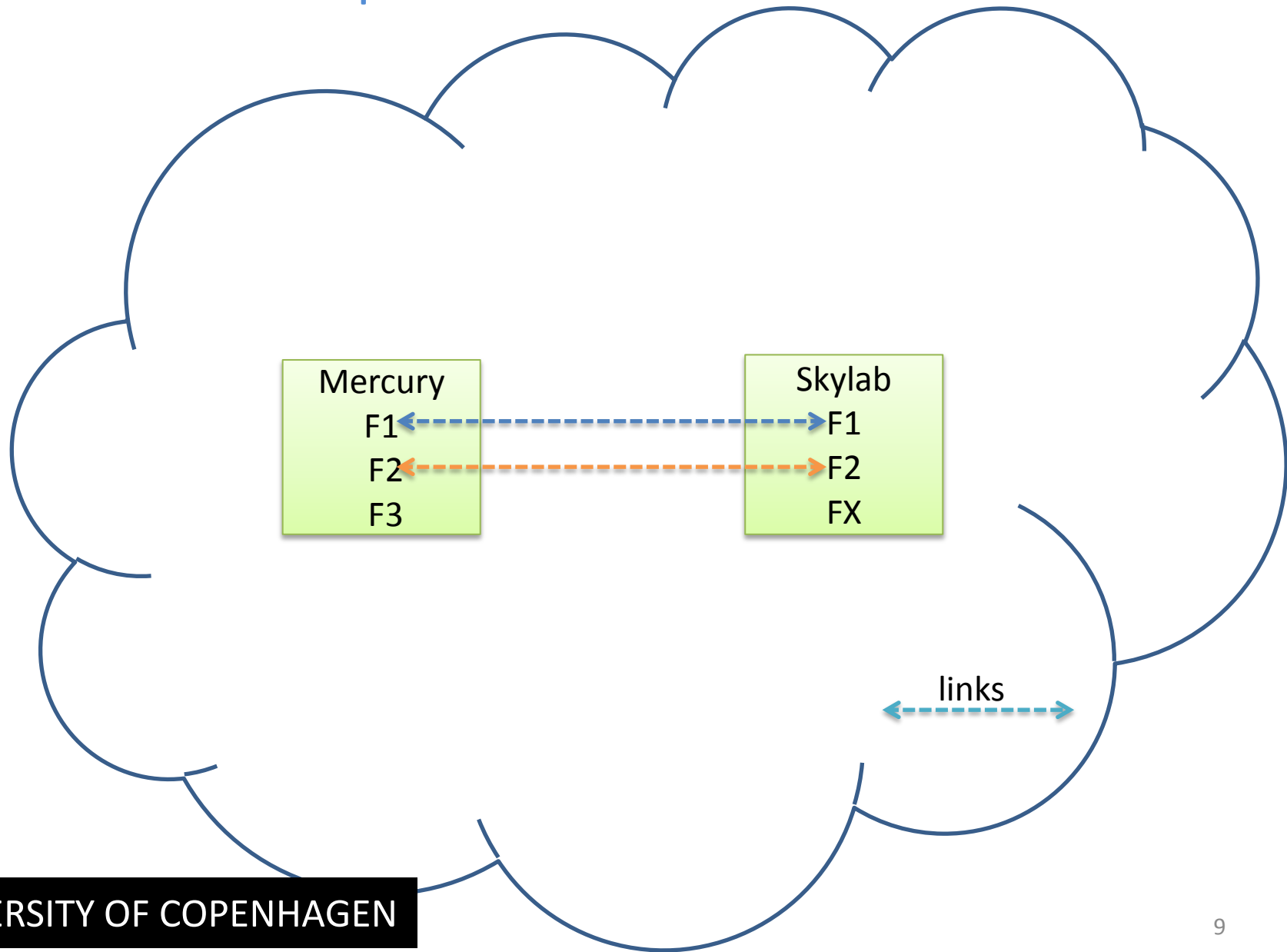
The first step towards suggesting alternatives that can replace cloning is to gain a better understanding of the current

- |            |                     |                           |
|------------|---------------------|---------------------------|
| Cloning is | ✓ Fast              | ✓ Cheap                   |
|            | ✓ Efficient         | ✓ Widely used and adopted |
|            | ✓ Easy              |                           |
| Clones are | ✗ Hard to maintain  |                           |
|            | ✗ Hard to propagate |                           |
|            | ✗ Not tracked       |                           |

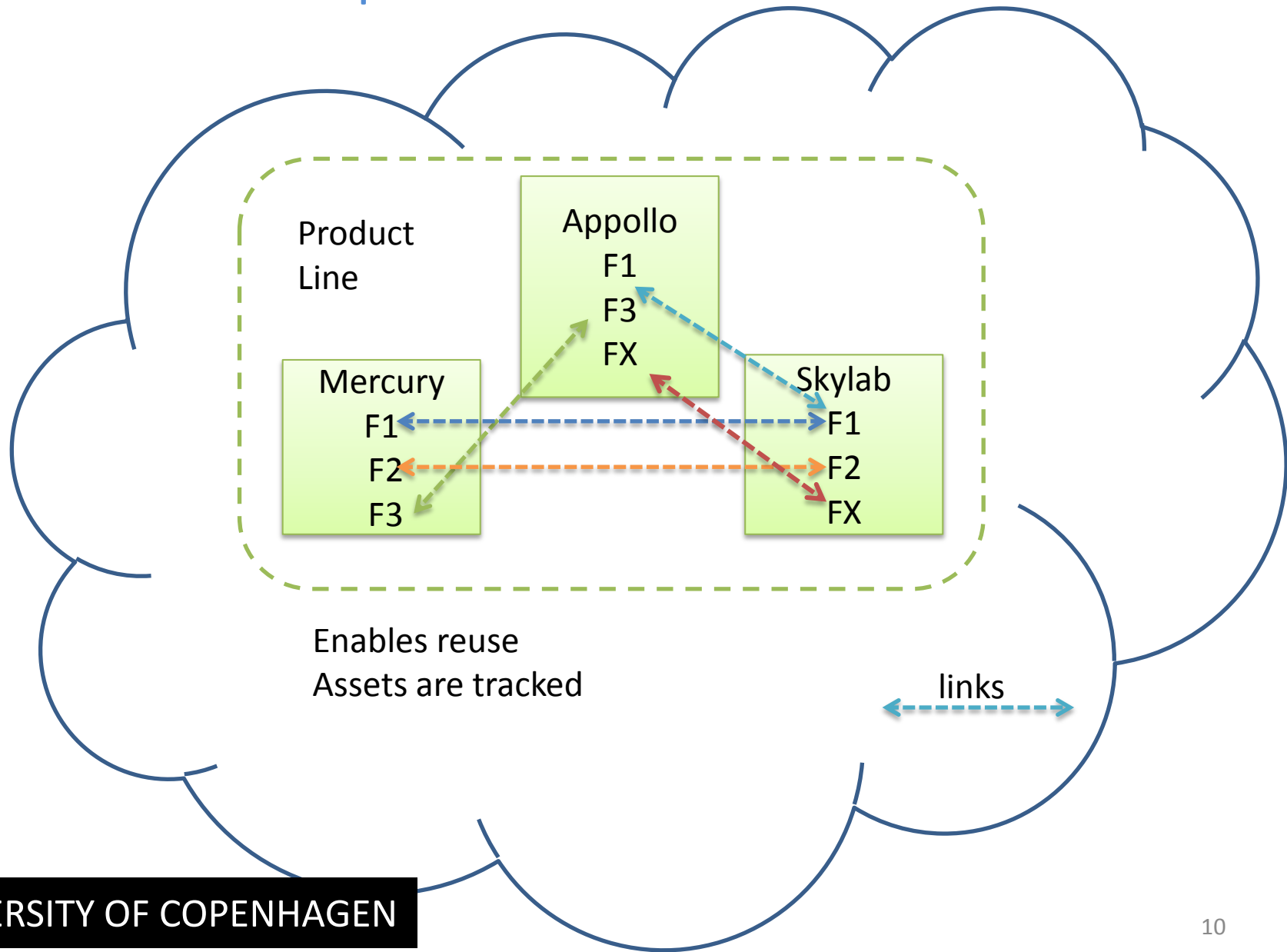
# Idea - *Virtual* platform



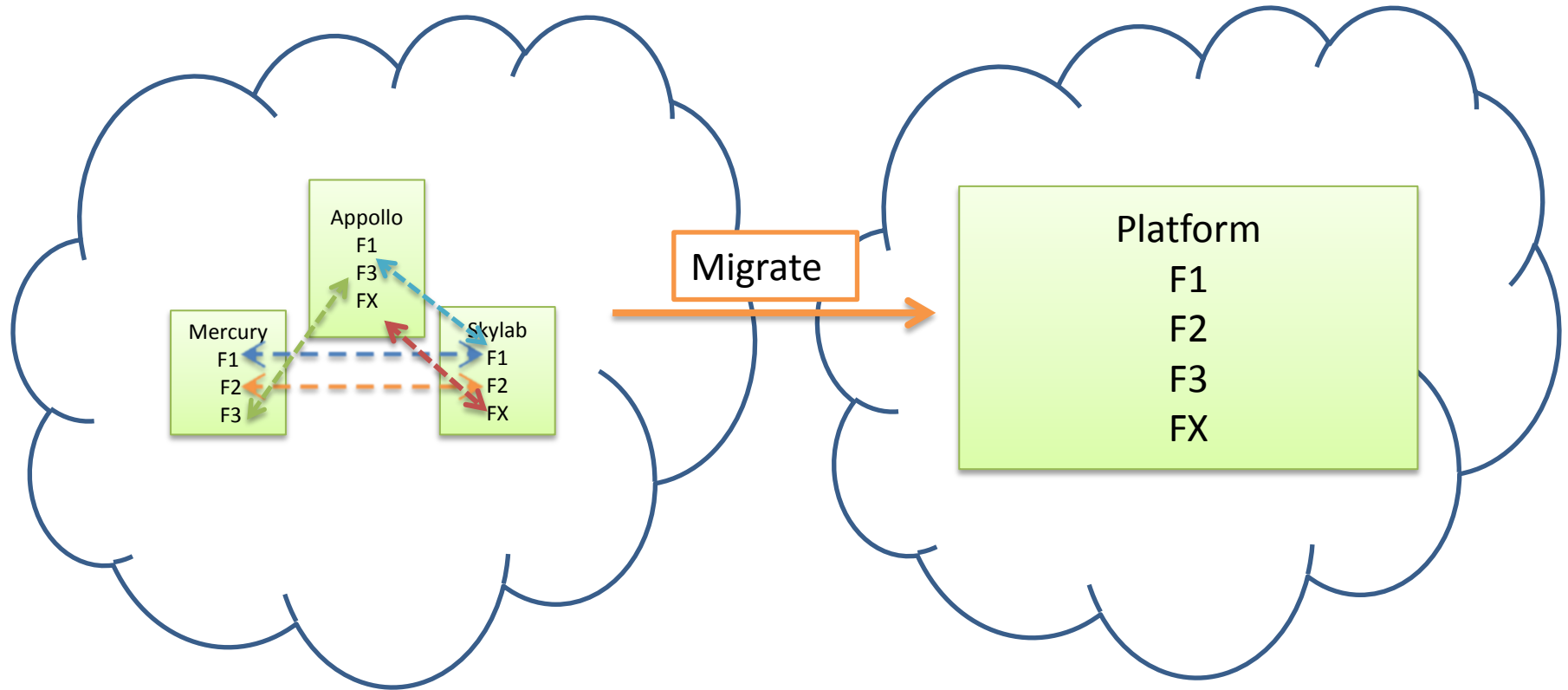
# Idea - *Virtual* platform



# Idea - *Virtual* platform



# Idea - *Virtual* platform



# Work in progress



- ❖ Feature control system
- ❖ The idea is to make it change oriented
- ❖ And to introduce variability at version control level (preprocessor directives)
- ❖ A layer on top of GIT

# Work in progress



git clone project car



git update feature doors



git update feature headlights



# Work in progress



git clone project car



git clone feature hardtop

git update feature wheels



# Work in progress



git clone project car



git clone feature hardtop

git update feature wheels



# Conclusion

- ❖ Cloning is fast, easy and reduces costs
- ❖ Cloning is widespread, even in the industry
- ❖ Virtual platform combines flexibility of cloning with the well defined processes of a product line