



# Poster: An Empirical Study on Using Hints from Past Fixes



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## Motivation

How many fixes can be constructed from past fixes ?

Repetitive bug fixes?

Past bug fixes

```

// ...
@Override
public void updateTable(String tableName, int refAction,
    ColumnDescriptorList cds) throws StandardException {
    DMLModStatementNode node = null;
    int index = tableName.indexOf('.');
    String schemaName = tableName.substring(0, index);
    String tableName = tableName.substring(index + 1);
    if(refAction == StatementType_RA_CASCADE) {
        node = getEmptyDeleteNode(schemaName, tableName);
        node = getEmptyDeleteNode(schemaName, tableName);
    }
}

```

New bug report

```

Exception from stream being inserted renders PooledConnection unusable from that point onwards

```

## Methodology

System dependency graphs

Delta graphs

### Overlap metrics

1. Fully overlapped bug fixes (FI): A previous fix covers both the structure and name changes of a new fix.
2. Partially overlapped bug fixes (PI): No previous fix can cover both the structure and name changes of a new fix, but the composition of some fixes cover both types of changes.
3. Fully overlapped structure changes (FS): The structure changes of a previous fix cover the structure changes of a new fix.
4. Partially overlapped structure changes (PS): The structure changes of a new fix are composed of known structure changes.
5. Fully overlapped name changes (FN): The name changes of a previous fix cover the name changes of a new fix.
6. Partially overlapped name changes (PN): The name changes of a new fix is composed by known name changes

## Early Results

Project	Both				Structure				Code Name				Fix
	FI	%	PI	%	FS	%	PS	%	FN	%	PN	%	
aries	8	1.8%	10	2.3%	38	8.6%	144	32.6%	16	3.6%	37	8.4%	442
cassandra	68	2.8%	115	4.7%	383	15.6%	1,202	48.8%	126	5.1%	327	13.3%	2,392
derby	37	1.5%	44	1.8%	249	10.4%	155	35.4%	12	2.7%	29	6.6%	438
mahout	9	2.1%	14	3.2%	47	10.7%	155	35.4%	12	2.7%	29	6.6%	438
total	122	2.1	183	3.2%	717	12.5%	2,366	41.3%	217	3.8%	562	9.8%	5,735

Overall result of learning from the same project

## Future Work

### 1. How creative is a bug fix?

Although many researchers admit the complexity of fixing bugs, some recent studies present contradicted evidences. This research question mainly concerns the explanation for the contradicted evidences. For each bug, we plan to investigate how many of its nodes and methods can be covered by past fixes. If a change never appears in past fixes, it shall be more difficult to be fixed and needs more creative activities.

### 2. What are the challenges when preparing the repository of past bug fixes?

For a bug under fixing, it needs to locate its related past fixes, before we can learn useful knowledge. This research question concerns how difficult it is to retrieve useful past fixes for a bug, which is reflected by the ratio from the useful past fixes to the total past fixes.

### 3. What is the potential to learn from other projects?

A project can have only limited past bug fixes, especially when the project is new. A natural way to handle this problem is to learn from other projects, but its effectiveness is largely unknown. To investigate this research question, we plan to explore to what degree can a new bug fix be constructed from past bug fixes from other projects.