

Is Refactoring Always a Good Egg? Exploring the Interconnection Between Bugs and Refactorings

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MSR 2022 - Mining Challenge

```
import { Prisma } from "../src/generated/prisma";

const db = new Prisma({
  endpoint: "http://localhost:4466/test/dev"
});

const setup = async () => {
  // Create user and related posts
  const user = await db.mutation.createUser({
    data: {
      name: "Kudakwashe",
      username: "kuda",
      posts: {
        create: [
          {
            intro: "first post",
            description: "first post description"
          },
          {
            intro: "second post",
            description: "second post description"
          }
        ]
      }
    }
  });
}

setup();
```

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```
// has a car and has insurance or has an old insurance
if($car.value !== '' &&
  $hybrid[0].value && hybrids.indexOf(type) > -1 ||
  type.indexOf('pt') > -1 && type.indexOf(':') == -1){
  //...
}
```

```
var hasCar = $car.value !== '';
var isHybrid = $hybrid[0].value && hybrids.indexOf(type) > -1;
var isOld = type.indexOf('pt') > -1 && type.indexOf(':') == -1;

if(hasCar && !isHybrid || isOld){
  //...
}
```

BUGS VS REFACTORING

DEFINITION



BUGS



REFACTORINGS

```
import { Prisma } from "../src/generated/prisma";

const db = new Prisma({
  endpoint: "http://localhost:4466/test/dev"
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const setup = async () => {
  // Create user and related posts
  const user = await db.mutation.createUser({
    data: {
```

RESEARCH QUESTIONS I

How common it is that a bug-fixing commit contains refactoring changes as well?

It is not uncommon for bug-fixes and code refactorings to co-occur in the same commit. We found that 41 out of the 96 projects had such commits.

BUGS VS REFACTORING

```
... and has insurance or has an old insurance
value !== '' &&
[0].value && hybrids.indexOf(type) > -1 ||
indexOf('pt') > -1 && type.indexOf(':') == -1){
//...
```

```
{
  intro: "second post",
  description: "second post description"
}
```

```
$car.value !== '';
= $hybrid[0].value && hybrids.indexOf(type) > -1;
type.indexOf('pt') > -1 && type.indexOf(':') == -1;
```

```
if(hasCar && !isHybrid || isOld){
  //...
}
```

```
import { Prisma } from "../src/generated/prisma";

const db = new Prisma({
  endpoint: "http://localhost:4466/test/dev"
});

const setup = async () => {
  // Create user and related posts
  const user = await db.mutation.createUser({
    data: {
```

RESEARCH QUESTIONS 2

Do refactoring operations appear in code modifications inducing bugs?

The presence of code refactoring is even more significant in bug-inducing commits than in bug-fixing ones.

BUGS VS REFACTORING

```
import { Prisma } from "../src/generated/prisma";
```

```
const db = new Prisma({  
  endpoint: "http://localhost:4466/test/dev"  
});
```

```
const setup = async () => {  
  // Create user and related posts  
  const user = await db.mutation.createUser({  
    data: {
```

RESEARCH QUESTIONS 3

What are the most common refactoring types appearing in bug inducing commits?

Type changes of variables and return statements, renaming attributes and variables, and extracting method or attribute are the most frequent refactoring appearing in bug-inducing commits.

```
{  
  intro: "second post",  
  description: "second post description"  
}
```

```
  and has insurance or has an old insurance  
  value !== '' &&  
  [0].value && hybrids.indexOf(type) > -1 ||  
  indexOf('pt') > -1 && type.indexOf(':') == -1){  
  //...
```

```
}
```

```
$car.value !== '';  
= $hybrid[0].value && hybrids.indexOf(type) > -1;  
type.indexOf('pt') > -1 && type.indexOf(':') == -1;
```

```
if(hasCar && !isHybrid || isOld){  
  //...  
}
```

BUGS VS REFACTORING