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

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```javascript
import { Prisma } from "./src/generated/prisma";
const db = new Prisma({
    endpoint: "http://localhost:4466/test/dev"
});

const setup = async () => {
    // Create new 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();
```

```javascript
// 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("s") == -1){
    //....
}
```

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

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

BUGS

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

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