Gmail **Anshuman Dhuliya <anshumandhuliya@gmail.com>**

simplification may not suffice

2 messages

Raghavan Komondoor V <raghavan@iisc.ac.in> Sat, May 11, 2019 at 6:19 PM
To: "dhuliya@cse.iitb.ac.in" <dhuliya@cse.iitb.ac.in>, "uday@cse.iitb.ac.in" <uday@cse.iitb.ac.in>

Hi Anshuman,

Consider this example:

```
a = 10;
while (..)
  a = a + 2;
b = 11;
while (..)
  b = b + 2;
if (a <= b) {
  if (a >= b) {
    S; // unreachable
  }
}
```

The statement S is unreachable.

A most-precise combination of a relational analysis (such as octagon analysis) with odd-even analysis can detect this. This is because, at the point along the "true" branch of the first "if" condition, 'a <= b' is known to hold, and `a' is known to be even and `b' is known to be odd. Therefore, `a' cannot be equal to `b', which means "a >= b" implies "a > b", which contradicts "a <= b".

However, no sequence of simplifications seems possible that would help either analysis conclude that S is unreachable. Am I right?

Raghavan.

Anshuman Dhuliya <anshumandhuliya@gmail.com> Sat, May 11, 2019 at 6:44 PM
To: Raghavan Komondoor V <raghavan@iisc.ac.in>
Cc: "dhuliya@cse.iitb.ac.in" <dhuliya@cse.iitb.ac.in>, "uday@cse.iitb.ac.in" <uday@cse.iitb.ac.in>

Yes that seems to be the case.

However, lets remove all restrictions on "simplification" for a moment.

One can program even-odd analysis to do enable the following simplification/transformation,

```
if (a <= b)
  if (a >= b)
    S
```

to

```
if (a < b)       // instead of a <= b which is semantically correct w.r.t even-odd information
  if (a >= b)
    S
```

Our definition of simplification doesn't allow this, but if this is made possible, then the relational analysis should be able to figure out that S is unreachable.

Thanks & Regards,
Anshuman Dhuliya
Research Scholar
CSE Department
IIT Bombay
Mumbai, India

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