

# fn then\_saturating\_cast\_hashmap

Michael Shoemate

This proof resides in “**contrib**” because it has not completed the vetting process.

Proves soundness of the implementation of `then_saturating_cast_hashmap` in `mod.rs` at commit `f5bb719` (outdated<sup>1</sup>).

## 1 Hoare Triple

### Precondition

#### Compiler-Verified

- Generic TK implements trait `Hashable`
- Generic TV implements trait `SaturatingCast<IBig>`

#### User-Verified

None

### Pseudocode

```
1 def then_saturating_cast_hashmap() -> Function[HashMap[TK, IBig], HashMap[TK, TV]]:  
2   return Function.new(lambda x: {k: TV.saturating_cast(v) for k, v in x.items()})
```

### Postcondition

**Theorem 1.1.** For every setting of the input parameters (TK, TV) to `then_saturating_cast_hashmap` such that the given preconditions hold, `then_saturating_cast_hashmap` raises an exception (at compile time or run time) or returns a valid postprocessor. A valid postprocessor has the following property:

1. (Data-independent errors). For every pair of elements  $x, x'$  in `input_domain`, `function(x)`, `function(x')` either neither or both raise an error. If both raise an error, then they both raise the same error.

*Proof.* Since `T.saturating_cast` is infallible, the function is infallible, meaning that the function cannot raise data-dependent errors. Therefore the function is a valid postprocessor.  $\square$

---

<sup>1</sup>See new changes with `git diff f5bb719..11c2f7f rust/src/measurements/noise_threshold/nature/integer/mod.rs`