Separation Logic

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Outline

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Brief recap: reasoning about code

- Program semantics described by logical conditions satisfied by language constructs
- Classical model, first put forward by Robert W. Floyd and Tony Hoare

Floyd-Hoare Logic in 1 slide

$$\{P\}S\{Q\}$$

- P : pre-conditions
- S : statement
- Q : post conditions

Partial correctness: **If the inital state fullfils pre-conditions and the statement terminates**, the final state satisfies the post conditions.

Total correctness: **If the initial state fullfils the pre-conditions** then the statement terminates and the final state satisfies the post-conditions.

Limitations

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Global view of state becomes a burden when introducing pointers(think of pointer aliasing..)

Motivating example

```
void deletetree(struct node
*root){ if(root != NULL){ struct
node *left = root->l; struct node
*right = root->r; deletetree(left);
deletetree(right); free(root); } }
```

How can we prove memory safety?

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