Some Side-Calculations

- $\vdash\{1 \leq x \wedge x \leq 10\}\ x := x+2\ \{3 \leq x \wedge x \leq 12\}$

- $3 \leq x \wedge x \leq 12\ [x \mapsto x+2]$
  $\equiv 3 \leq x+2 \wedge x+2 \leq 12$
  $\equiv 1 \leq x \wedge x \leq 10$

- $x=2\ [x \mapsto 2]$
  $\equiv 2 = 2$
  $\equiv$ true

- (Pre, cond, Post) notation syntaxique pour $\vdash\{Pre\}\ cond\ \{Post\}$
- $\neg(0 \leq x) \longrightarrow (0 \leq -x)$
  $\equiv x < 0 \longrightarrow x \leq 0$
  $\equiv$ true

Measures and Termination

- Mesure (Variant)
- measure(x) = -x + 2

- Condition generale de terminaison

  measure(x) > measure(bodywhile(x))

- Dans le cas concret :
  - -x + 2 > -(x+1) + 2

    ≡ -x + 2 > -x -1 +2

    ≡ -x + 2 > -x +1

    ≡ true

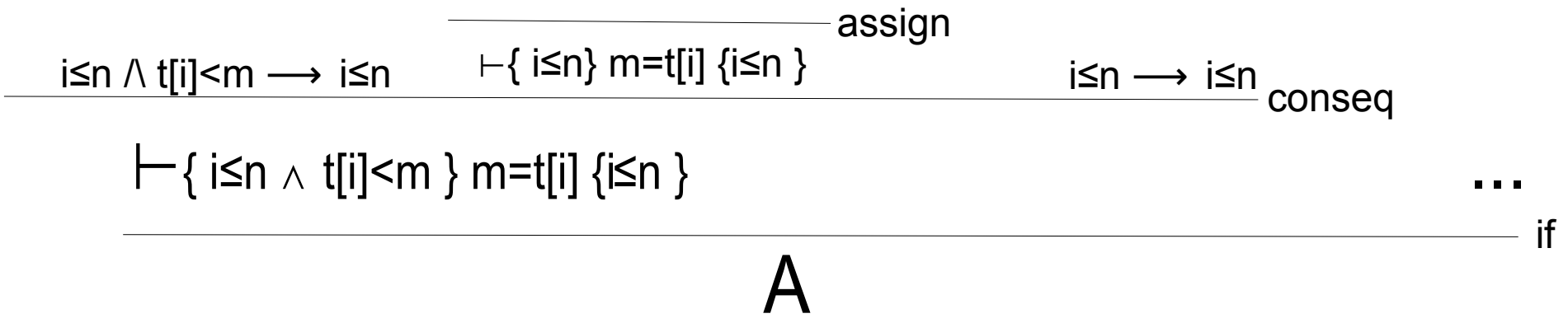
The Task

```
int min(int t[],int n) {
  int i = 1;
  int m = t[0];

  while(i < n) {
    if(t[i] < m) {
      m = t[i];
    }
    i = i + 1;
  }
  return m;
}
```

The Task

- $\vdash\{\ i \le n\ \}$ if(t[i]<m) then m=t[i] else SKIP $\{i \le n\ \}$
  $\equiv A$



- $\vdash_{\{i \le n\}} m = t[i] \ \{i \le n\}$

- $i \le n \ [m \mapsto t[i]]$

  $\equiv i \le n$

- Tautologies :

  $A \longrightarrow A$

  $A \wedge B \longrightarrow A$

  $A \wedge B \longrightarrow B \wedge A$

  $A \longrightarrow A \vee B$

- $\forall x \in \{0..i\}.\ m \le t[x] \wedge \exists x \in \{0..i\}.\ m = t[x]$