

SOEN 342 - Sections H and II:
Software Requirements and Specifications

Project

Imane Madda 40208741

Racha Kara 40210865

Samy Arab 40209595

November 8, 2023

1 Updated formal specification in Z

1.1 Schemas

<i>TempMonitor</i>
$deployed : \mathbb{P} \text{ SENSOR_TYPE}$ $map : \text{SENSOR_TYPE} \nrightarrow \text{LOCATION_TYPE}$ $read : \text{SENSOR_TYPE} \nrightarrow \text{TEMPERATURE_TYPE}$
$deployed = \text{dom } map$ $deployed = \text{dom } read$

<i>DeploySensorOK</i>
$\Delta \text{TempMonitor}$ $sensor? : \text{SENSOR_TYPE}$ $location? : \text{LOCATION_TYPE}$ $temperature? : \text{TEMPERATURE_TYPE}$
$sensor? \notin deployed$ $location? \notin \text{ran } map$ $deployed' = deployed \cup \{sensor?\}$ $map' = map \cup \{sensor? \mapsto location?\}$ $read' = read \cup \{sensor? \mapsto temperature?\}$

<i>ReadTemperatureOK</i>
$\exists \text{TempMonitor}$ $location? : \text{LOCATION_TYPE}$ $temperature! : \text{TEMPERATURE_TYPE}$
$location? \in \text{ran } map$ $temperature! = read(map^{-1}(location?))$

<i>Success</i>
$\exists \text{TempMonitor}$ $response! : \text{MESSAGE}$
$response! = 'ok'$

<i>SensorAlreadyDeployed</i>
$\exists TempMonitor$ $sensor? : SENSOR_TYPE$ $response! : MESSAGE$
$sensor? \in deployed$ $response! = 'Sensor\ deployed'$

<i>LocationAlreadyCovered</i>
$\exists TempMonitor$ $location? : LOCATION_TYPE$ $response! : MESSAGE$
$location? \in \text{ran } map$ $response! = 'Location\ already\ covered'$

<i>LocationUnknown</i>
$\exists TempMonitor$ $location? : LOCATION_TYPE$ $response! : MESSAGE$
$location? \notin \text{ran } map$ $response! = 'Location\ not\ covered'$

<i>RemoveSensorOK</i>
$\Delta TempMonitor$ $sensor? : SENSOR_TYPE$
$sensor? \in deployed$ $deployed' = deployed \setminus \{sensor?\}$ $map' = map \setminus \{sensor? \mapsto location?\}$ $read' = read \setminus \{sensor? \mapsto temperature?\}$

<i>AllLocationTemperaturePairs</i>
$\exists TempMonitor$ $pairs! : \mathbb{P} [LOCATION_TYPE, TEMPERATURE_TYPE]$
$\forall i : pairs! = pairs! \oplus \{\text{ran } map(i), read(map^{-1}(\text{ran } map(i)))\}$

1.2 Operations

$$\begin{aligned} \textit{DeploySensor} &\hat{=} \\ &(\textit{DeploySensorOK} \wedge \textit{Success}) \oplus \\ &(\textit{SensorAlreadyDeployed} \vee \textit{LocationAlreadyCovered}) \end{aligned}$$

$$\begin{aligned} \textit{ReadTemperature} &\hat{=} \\ &(\textit{ReadTemperatureOK} \wedge \textit{Success}) \oplus \textit{LocationUnknown} \end{aligned}$$