Based on the newly specified requirements, the following is the refined domain model for iteration 2.
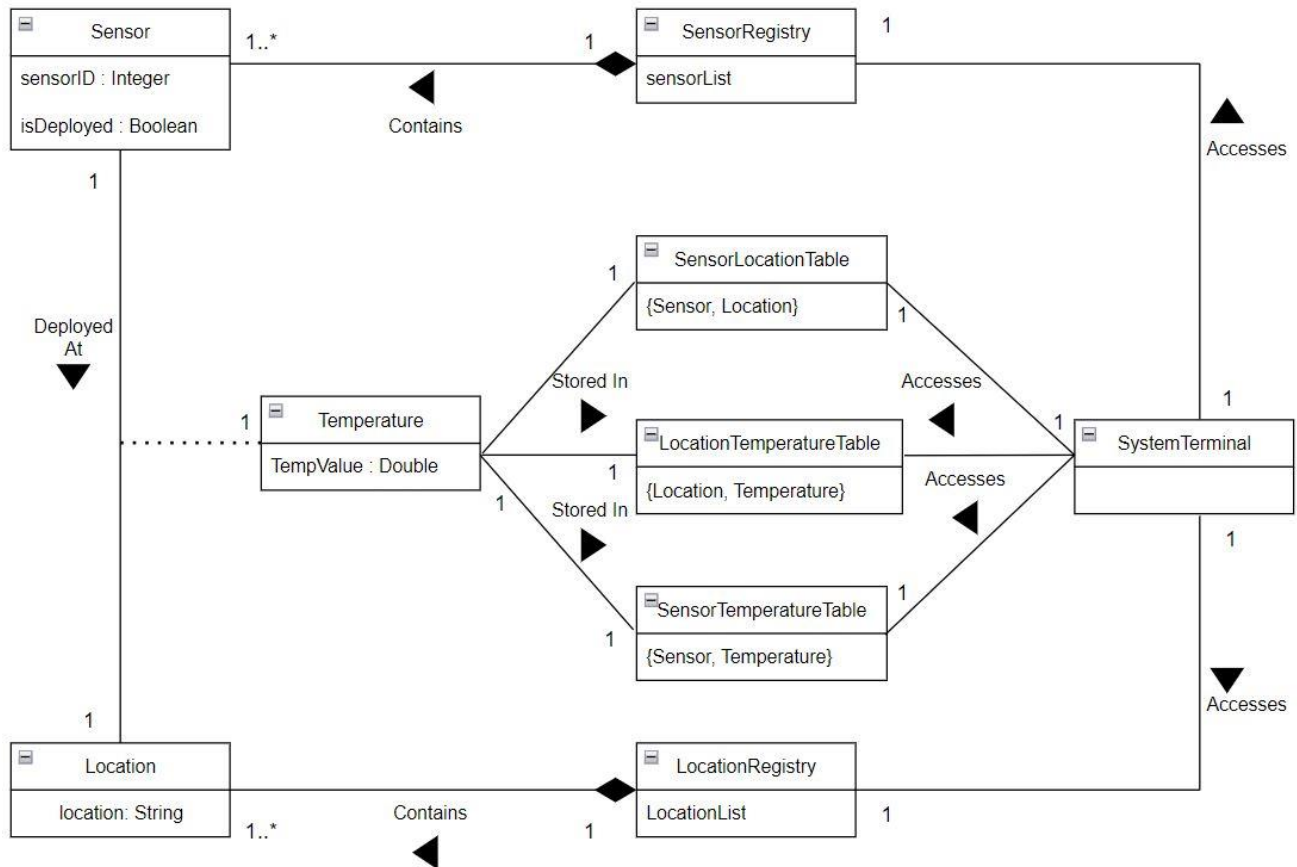

Figure 1: Domain Model - Updated for Iteration 2

Based on the given new requirements, we have extended the Z specification using LaTeX on the TeXstudio platform. We created 2 schemas *ReplaceSensorOK* and *ReturnCollectionOK* (see next page, along with the previously defined *TempMonitor* schema), which are used to define the two operations *ReplaceSensor* and *ReturnCollection*. Both of these new operations use the schemas already given in the first iteration.

Completing Z Specifications

November 1, 2023

TempMonitor

$deployed\ :\ \mathbb{P}\ SENSOR\_TYPE$
$map : SENSOR\_TYPE \nrightarrow LOCATION\_TYPE$
$read : SENSOR\_TYPE \nrightarrow TEMPERATURE\_TYPE$

$deployed = \mathrm{dom}\ map$
$deployed = \mathrm{dom}\ read$

ReplaceSensorOK

$\Delta TempMonitor$
$location? : LOCATION\_TYPE$
$new\_sensor? : SENSOR\_TYPE$

$new\_sensor? \notin deployed$
$deployed' = deployed \setminus \{map^{-1}(location?)\}$
$map' = \{map^{-1}(location?)\} \lhd map$
$map' = map \oplus \{new\_sensor? \mapsto location?\}$

ReturnCollectionOK

$\Xi TempMonitor$
$locations!\ :\ \mathbb{P}\ LOCATION\_TYPE$
$temperatures!\ :\ \mathbb{P}\ TEMPERATURE\_TYPE$

$locations! = \mathrm{ran}\ map$
$temperatures! = \mathrm{ran}\ read$

$ReplaceSensor \mathrel{\widehat{=}} (ReplaceSensorOK \wedge Success) \oplus (LocationUnkown \vee SensorAlreadyDeployed)$

$ReturnCollection \mathrel{\widehat{=}} ReturnCollectionOK$