

Figure **Error! No text of specified style in document.**. Structure diagram

# Explanation of state variables

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| Variable | Explanation |
| current\_row | Row ID of the Spaceship’s current location |
| current\_column | Column ID of the Spaceship’s current location |
| route | Route of the spaceship (i.e. empty squares of the space grid, which were visited by the Spaceship) |
| power\_units | Remaining amount of power units in the Spaceship |
| accident\_count | Number of accidents that the Spaceship met with, meanwhile traveling around the space |

# Explanation of state invariants

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| --- | --- |
| Invariant | Explanation |
| current\_row : NAT1 | current\_row belongs to the built-in typeset, natural numbers, starting with 1. Here, the lower limit of the variable is implicitly implied as 1. |
| current\_row <= 7 | current\_row can only hold up to the value 7 (upper limit) |
| current\_column : NAT1 | current\_column belongs to the built-in typeset, natural numbers, starting with 1. Here, the lower limit of the variable is implicitly implied as 1. |
| current\_column <= 12 | current\_column can only hold up to the value 12 (upper limit) |
| route : seq(grid) | route is defined as a sequence over the relation, “grid”. Reason for selecting a sequence is because we need to record the path which was travelled by the Spaceship in ascending order. |
| power\_units : NAT | power\_units belongs to the built-in typeset, natural numbers, starting with 1. Here, the lower limit of the variable is implicitly implied as 0. |
| power\_units <= initial\_power\_units | power\_units variable can’t hold a value greater than the value specified by the “initial\_power\_units” constant. (i.e. upper limit = initial\_power\_units) |
| accident\_count : NAT | The Spaceship may not encounter with a single accident during the journey, hence natural numbers typeset, starting with 0 has been selected, over the natural numbers typeset staring with 1. |