```
m := c \mid u
           \tau := \operatorname{int} \mid (\operatorname{ptr} m \omega)
           \omega := \tau \mid (\mathsf{struct}\ T)
                 | (array le he \tau) |
                 | (ntarray le he \tau) |
          v\tau := \text{int} \mid (\text{ptr } m \ v\omega)
         v\omega := v\tau \mid (\mathsf{struct}\ T)
                 | (array l h v\tau) |
                  I (ntarray l h v\tau)
            e := (n : \tau) \mid x \mid (\text{let } x = e \text{ in } e) \mid (\text{malloc } \omega) \mid (\text{cast } \tau e)
                  |(e + e)|(\& e \to f)|(*e)|(*e = e)|(unchecked e)
                 | (if e e e)
                  (strlen e)
                  I(dyn-bound-cast \tau e)
                 I (call n e ...)
          ee := i \mid x \mid (\mathsf{malloc}\ ee)
                  |(ee + ee)|(ee - ee)|(*ee)|(*ee = ee)
                  |(x = ee)|
                 | (ee <=? ee)
                 l (if ee ee ee)
                  I(let x = ee in ee)
                 l (strlen ee)
                 | (call n ee ...)
                 l (enull) l (ebounds)
     le, he := l \mid ls
     ls, hs := (x + l)
           F ::= ((\text{defun } ((x : \tau) ... e) : \tau) ...)
        n, k ::= natural
     l, h, i := integer
          D ::= ((Tfs) ...)
fs := ((v\tau f) (v\tau f) ...)

fs := ((v\tau f) (v\tau f) ...)

fs := variable-not-otherwise-mentioned
          H ::= ((n : v\tau) \dots)
         eH ::= (n ...)
         eF ::= ((defun \ x ... \ ee) ...)
            r := e \mid \varepsilon
          er := ee \mid \varepsilon
           \varepsilon ::= \text{Null} \mid \text{Bounds}
           E := [] | (let x = E in e) | (let x = (n : v\tau) in E) | (E + e) | ((n : v\tau) + E)
                 |(\& E \rightarrow f)| (cast E\tau e) | (cast v\tau E) | (* E) | (* E) | (* E) | (* E) | (unchecked E)
                 I (if E e e)
                  (strlen E)
                  I \text{ (malloc } E\omega)
                  |(n:E\tau)|
                 | (call \ n \ (n : v\tau) \dots E \ e \dots ) |
        E\omega := (\operatorname{array} [] he \tau)
| (array l [] \tau)
                 l (array l h E\tau)
                  I (ntarray [] he \tau)
                 I (ntarray l [] \tau)
                 l \text{ (ntarray } l \text{ } \vec{h} \text{ } \vec{E}\tau)
                  \mid E\tau
         E\tau := (\mathsf{ptr}\ m\ E\omega)
         eE := []
                  |(eE + ee)|(i + eE)
                  |(x = eE)|
                 |(eE - ee)|(i - eE)
|(*eE)|(*eE = ee)|(*i = eE)
                  |(eE \leq ee)|
                  |(i \leq eE)|
                  ∣ (if eE ee ee)
                  I (strlen eE)
```