# Spécification

## Engine

**Service**: Engine

**Types**: bool, int, Commande

**Observators**:

const height: [Engine] 🡪 int

const width: [Engine] 🡪 int

char: [Engine] × int 🡪 Character

**pre** char(E,i) **requires** i 2 f1, 2g

player: [Engine] × int 🡪Player

**pre** player(E,i) **requires** i 2 f1, 2g

gameOver: [Engine] 🡪bool

**Constructors**:

init: int × int × int × Player × Player 🡪 [Engine]

**pre** init(h,w,s,p1,p2) **requires** h > 0 && s > 0 && w > s && p1 != p2

**Operators**:

step: [Engine] × Commande × Commande 🡪 [Engine]

**pre** step(E) **requires** : gameOver(E)

**Observations**:

[**invariant**]:

gameOver(E) = 9i 2 f1, 2g **Character** ::dead(player(E, i))

[**init**]:

height(init(h, w, s, p1, p2)) = h

width(init(h, w, s, p1, p2)) = w

player(init(h, w, s, p1, p2), 1) = p1

player(init(h, w, s, p1, p2), 2) = p2

**Character** ::positionX(char(init(h, w, s, p1, p2), 1)) = w//2 − s//2

**Character** ::positionX(char(init(h, w, s, p1, p2), 2)) = w//2 + s//2

**Character** ::positionY(char(init(h, w, s, p1, p2), 1)) = 0

**Character** ::positionY(char(init(h, w, s, p1, p2), 2)) = 0

**Character** ::faceRight(char(init(h, w, s, p1, p2), 1))

**Character** :::faceRight(char(init(h, w, s, p1, p2), 2))

[**step**]:

char(step(E, C1, C2), 1) = step(char(E, 1), C1)

char(step(E, C1, C2), 2) = step(char(E, 2), C2)

## Hitbox

**Service**: Hitbox

**Types**: bool, int

**Observators**:

PositionX: [Hitbox] 🡪 int

PositionY: [Hitbox] 🡪 int

Hauteur: [Hitbox] 🡪 int

Longueur: [Hitbox] 🡪 int

BelongsTo: [Hitbox] × int × int 🡪 bool

CollidesWith: [Hitbox] × Hitbox 🡪 bool

EqualsTo: [Hitbox] × Hitbox 🡪 bool

**Constructors**:

init: int × int x int x int🡪 [Hitbox]

**pre** init(x, y, h, l) **requires** h > 0 && l > 0

**Operators**:

MoveTo: [Hitbox] × int × int 🡪 [Hitbox]

**Observations**:

[**invariant**]:

CollidesWith(H,H1) = 9 x,y:int × int, BelongsTo(H,x,y) && BelongsTo(H1,x,y)

EqualsTo(H,H1) = 8 x,y:int × int, BelongsTo(H,x,y) = BelongsTo(H1,x,y)

[**init**]:

PositionX(init(x, y, h, l)) = x

PositionY(init(x, y, h, l)) = y

Hauteur(init(x, y, h, l)) = h

Longueur(init(x, y, h, l)) = l

[**MoveTo**]:

PositionX(MoveTo(H,x,y)) = x

PositionY(MoveTo(H,x,y)) = y

8 u,v:int × int, BelongsTo(MoveTo(H,x,y),u,v) =

Belongsto(H,u-(x-PositionX(H)),v-(y-PositionY(H))

## Character

**Service**: Character

**Types**: bool, int, Commande

**Observators**:

positionX: [Character] 🡪 int

positionY: [Character] 🡪 int

engine: [Character] 🡪 Engine

charBox: [Character] 🡪 Hitbox

life: [Character] 🡪 int

**const** speed: [Character] 🡪 int

faceRight: [Character] 🡪 bool

dead: [Character] 🡪 bool

**Constructors**:

init: int × int × bool × Engine 🡪 [Character]

**pre** init(l,s,f,e) **requires** l > 0 && s > 0

**Operators**:

moveLeft: [Character] 🡪 [Character]

moveRight: [Character] 🡪 [Character]

switchSide: [Character] 🡪 [Character]

step: [Character] × Commande 🡪 [Character]

**pre** step() **requires** :dead

**Observations**:

[**invariant**]:

positionX(C) > 0 && positionX(C) < **Engine**:: width(engine)

positionY(C) > 0 && positionY(C) < **Engine**:: height(engine)

dead(C) = !(life > 0)

[**init**]:

life(init(l, s, f, e)) = l && speed(init(l, s, f, e)) = s && faceRight(init(l, s, f, e)) = f

&&engine(init(l, s, f, e)) = e

9h :Hitbox, charbox(init(l, s, f, e)) = h

[**moveLeft**]:

(9i, player(engine(C), i) 6= C && collisionwith(hitbox(moveLeft(C)), hitbox(player(engine(C), i))))

) positionX(moveLeft(C)) = positionX(C)

positionX(C) ≤ speed(C)

&&(8i, player(engine(C), i) 6= C ) :collisionwith(hitbox(moveLeft(C)), hitbox(player(engine(C), i))))

) positionX(moveLeft(C)) = positionX(C) − speed(C)

positionX(C) > speed(C)

&&(8i, player(engine(C), i) 6= C ) :collisionwith(hitbox(moveLeft(C)), hitbox(player(engine(C), i))))

) positionX(moveLeft(C)) = 0

faceRight(moveLeft(C)) = faceRight(C) && life(moveLeft(C)) = life(C)

positionY(moveLeft(C)) = positionY(C)

[**moveRight**]:

: : :

[moveUpRight]

[moveUpLeft]

[moveUpNeutral]

[moveDownRight]

POST BAISSEMENT HAUTEUR HITBOX

[moveDownLeft]

[**switchSide**]:

faceRight(switchSide(C))! = faceRight(C)

positionX(switchSide(C)) = positionX(C)

[**step**]:

step(C, LEFT) = moveLeft(C)

step(C, RIGHT) = moveRight(C)

step(C, NEUTRAL) = C

step(C, UPRIGHT) = moveUpRight(C)

step(C, UPLEFT) = moveUpLeft(C)

step(C, UPNEUTRAL) = moveUpNeutral(C)

step(C, DOWNRIGHT) = moveDownRight(C)

step(C, DOWNLEFT) = moveDownLeft(C)

step(C, DOWNNEUTRAL) = moveDownNeutral(C)

## FighterCharacter

**Service**: FighterCharacter refines Character

**Observators**:

isBlocking: [FightChar] 🡪 bool

isBlockstunned: [FightChar] 🡪 bool

isHitstunned: [FightChar] 🡪 bool

isTeching: [FightChar] 🡪 bool

tech: [FightChar] 🡪 Tech

**pre** tech(C) **requires** isTeching(C)

techFrame: [FightChar] 🡪 bool

**pre** techFrame(C) **requires** isTeching(C)

techHasAlreadyHit: [FightChar] 🡪 bool

**pre** techHasAlreadyHit(C) **requires** isTeching(C)

**Operators**:

startTech: [FightChar] × Tech 🡪2