HARRY POTTER
CONTRE
LA FORCE OBSCURE

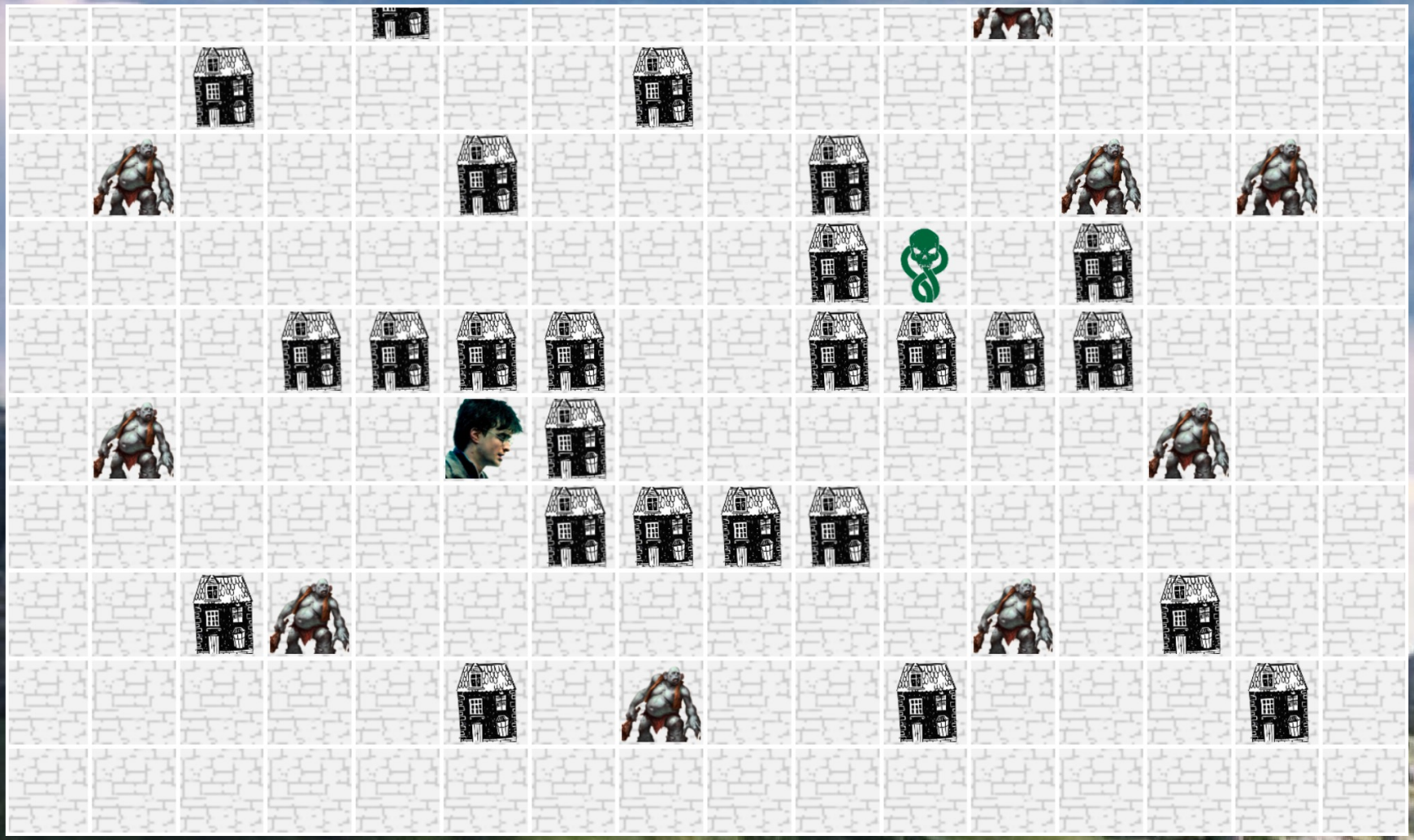

Harry Potter


Voldemort


Troll


Mangemort


Bâtiment



Mission : Trouvez Voldemort

Le problème

Trouver le chemin le plus court

de  à 

en évitant les  les  et les 

Trouver le chemin le plus court entre deux objets, en évitant les obstacles.

Concepts clés de cette mission

algorithme

opérations primitives

conditions

test *if* (SI … ALORS … SINON)

boucle *while* (TANT QUE … FAIRE …)

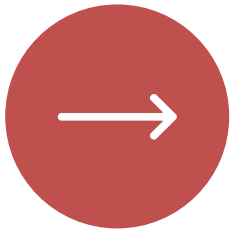
sous-problème

Algorithme

Un *algorithme* est une description d'une procédure systématique décrivant des instructions à exécuter.

Trouver le chemin le plus court entre deux objets, en évitant les obstacles.

Opérations primitives



MOVE()

TURN_RIGHT()

TURN_LEFT()

DESTROY_VOLDEMORT()

Conditions

CAN_MOVE()

IS_IN_FRONT_OF_ENEMY()

IS_ON_TARGET()

Possibilité de combiner des conditions

Conditions

Logique	Python
condition **et** condition	`cond1 and cond2`
condition **ou** condition	`cond1 or cond2`
non condition	`not cond`
Vrai	`True`
Faux	`False`

Un peu de logique

Vrai **et** Vrai	Vrai
Vrai **et** Faux	Faux
Faux **et** Vrai	Faux
Faux **et** Faux	Faux

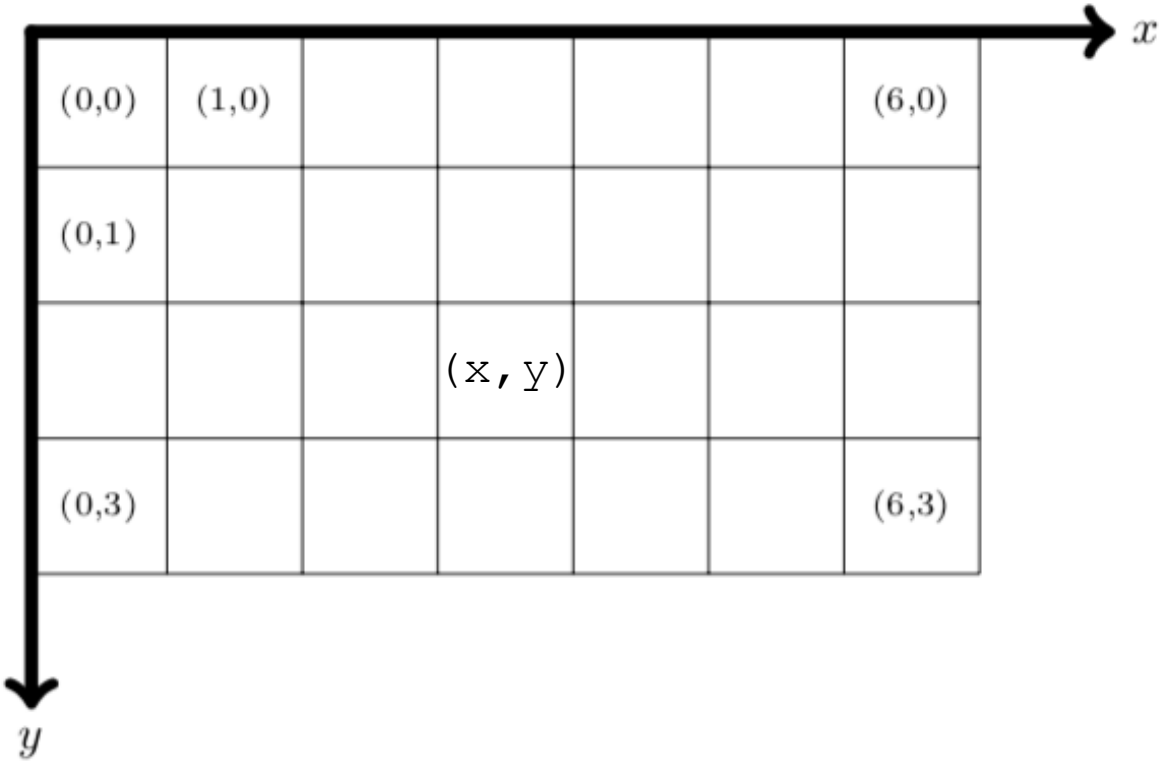
Un peu de logique

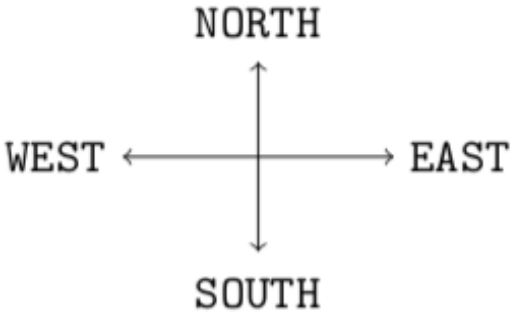
Vrai **ou** Vrai	Vrai
Vrai **ou** Faux	Vrai
Faux **ou** Vrai	Vrai
Faux **ou** Faux	Faux

Un peu de logique

non Vrai	Faux
non Faux	Vrai

Coordonnées et directions





Récupération de l'état du terrain

`get_direction()`

Retourne EAST, WEST, SOUTH ou NORTH

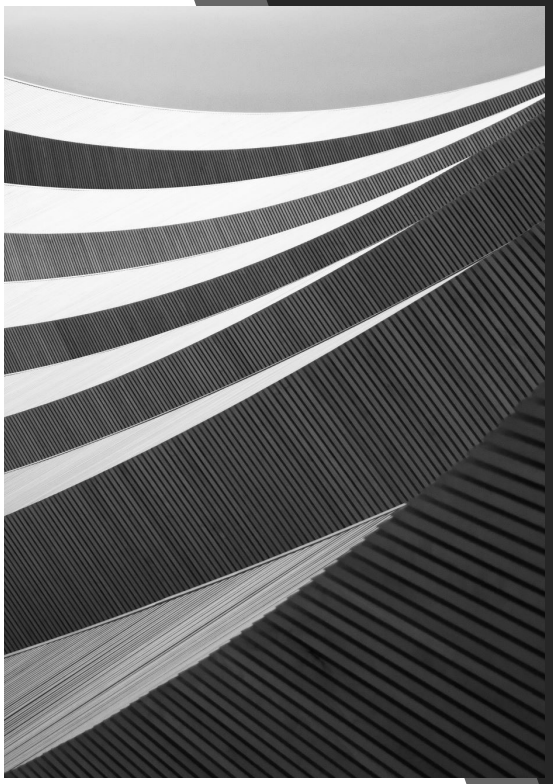
`get_x()`, `get_y()`

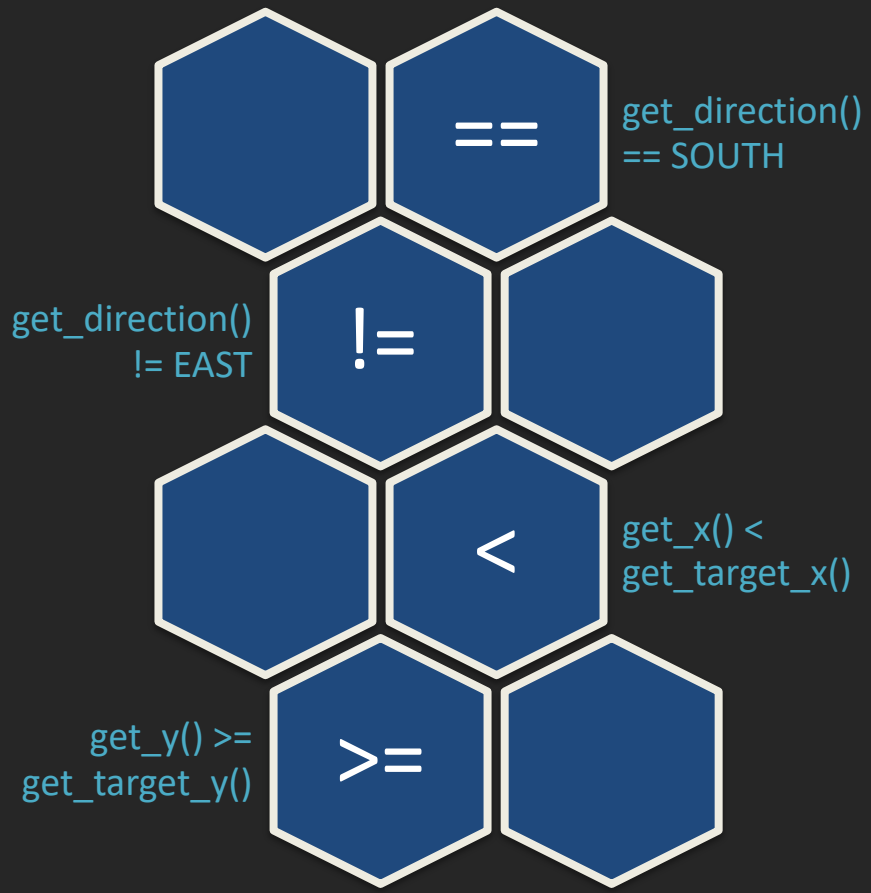
Retourne la coordonnée x ou y de 

`get_target_x()`, `get_target_y()`

Retourne la position x ou y de 

Opérateurs de comparaison

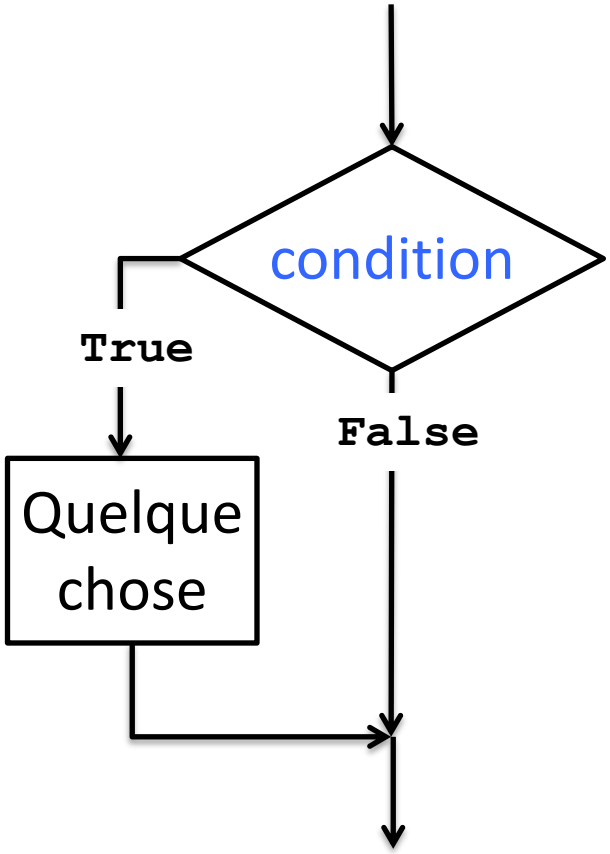




Test (1 branche)

SI condition
ALORS Quelque chose

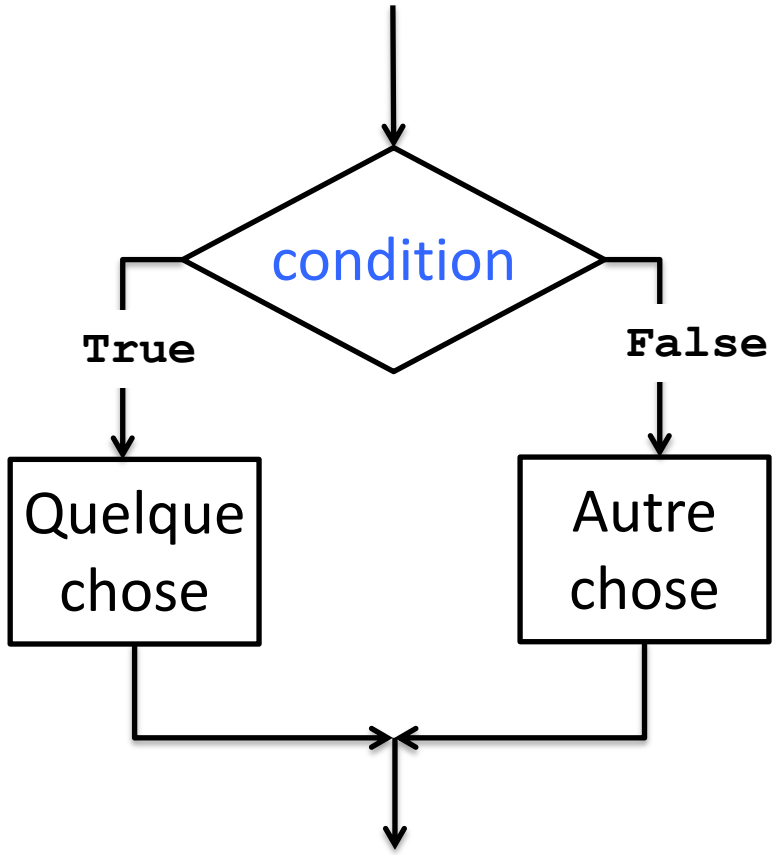
```
if cond:
   qqchose
```



Test (2 branches)

SI condition
ALORS Quelque chose
SINON Autre chose

```
if cond:
   qqchose
else:
   autrechose
```

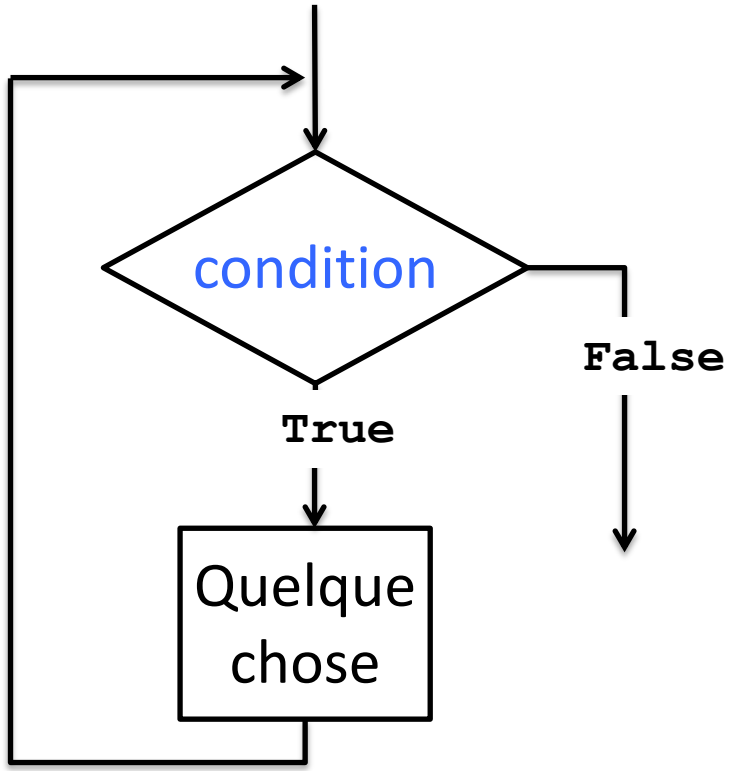


Exemple d'un test avec 2 branches

Boucle

TANT QUE condition
FAIRE Quelque chose

```
while cond:
    qqchose
```



Exemple d'une boucle

```
TANT QUE  Harry peut bouger FAIRE
|
|     avancer d'une case
|
```

Pseudo code

```
while can_move():

    move()
```

Code

Combiner une boucle et un test

```
TANT QUE Harry peut bouger FAIRE
|
|     avancer d'une case
|     SI Harry peut bouger ALORS
|     |
|     |     avancer d'une case
|     |
|     SINON
|     |
|     |     tourner vers la gauche
```

Pseudo code

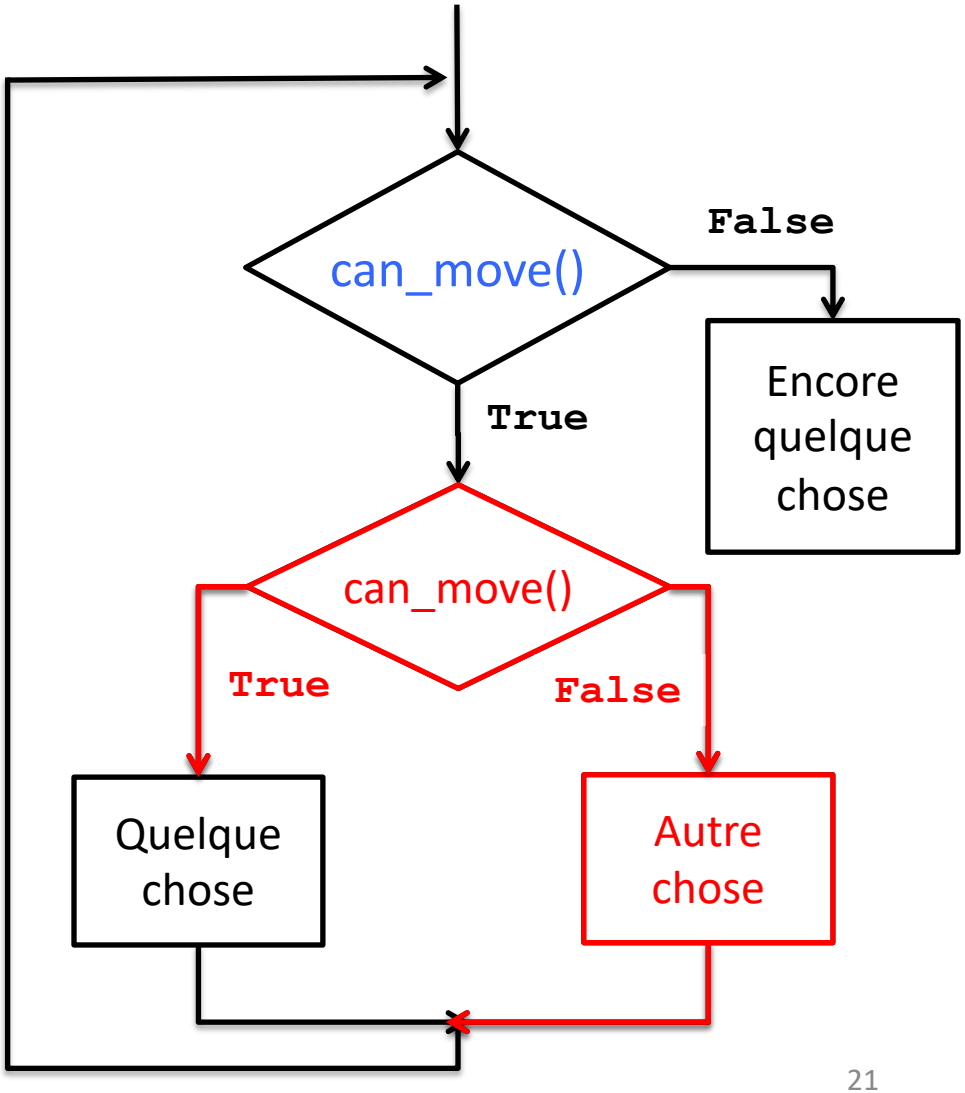
```
while can_move():

    move()
    if can_move():

        move()

    else:

        turn_left()
```

Code

Combiner une boucle et un test

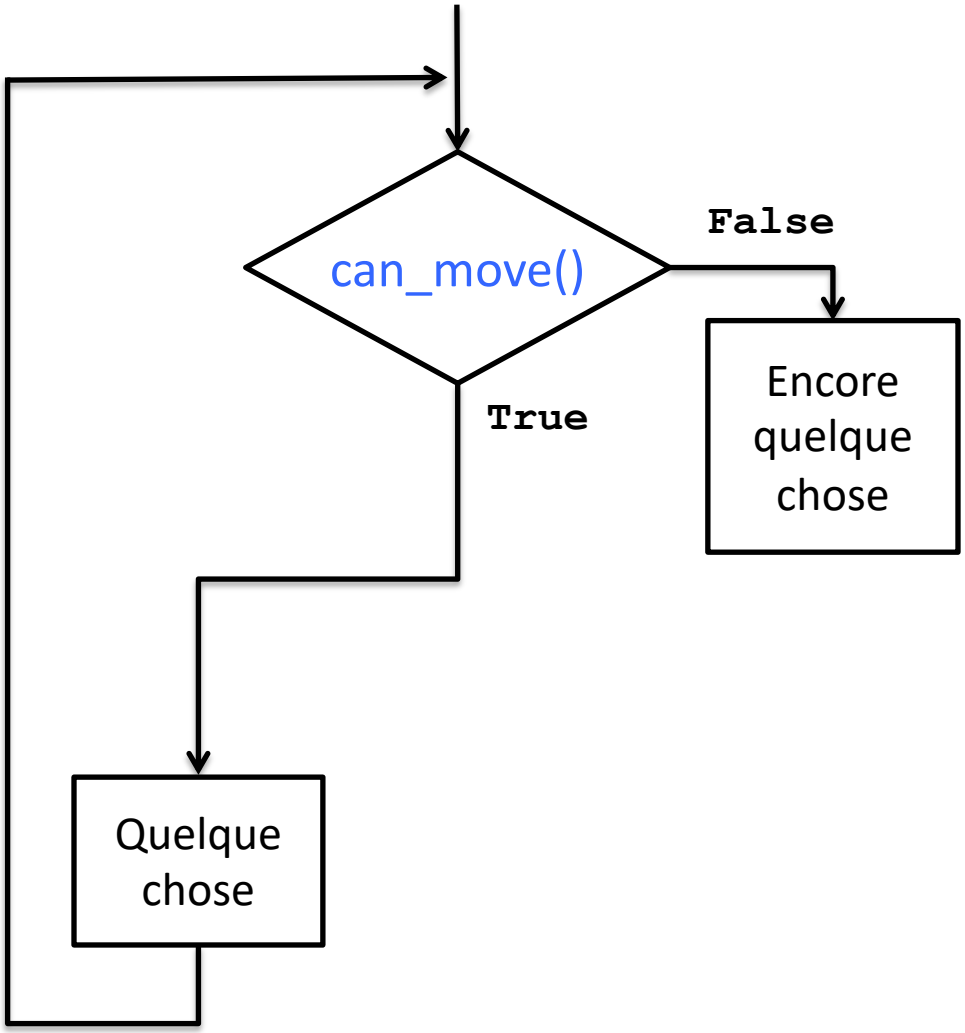
Quel est le problème avec le programme suivant?

```
while can_move():
    if can_move():
        #qqchose
    else:
        #autrechose
#encoreqqchose
```

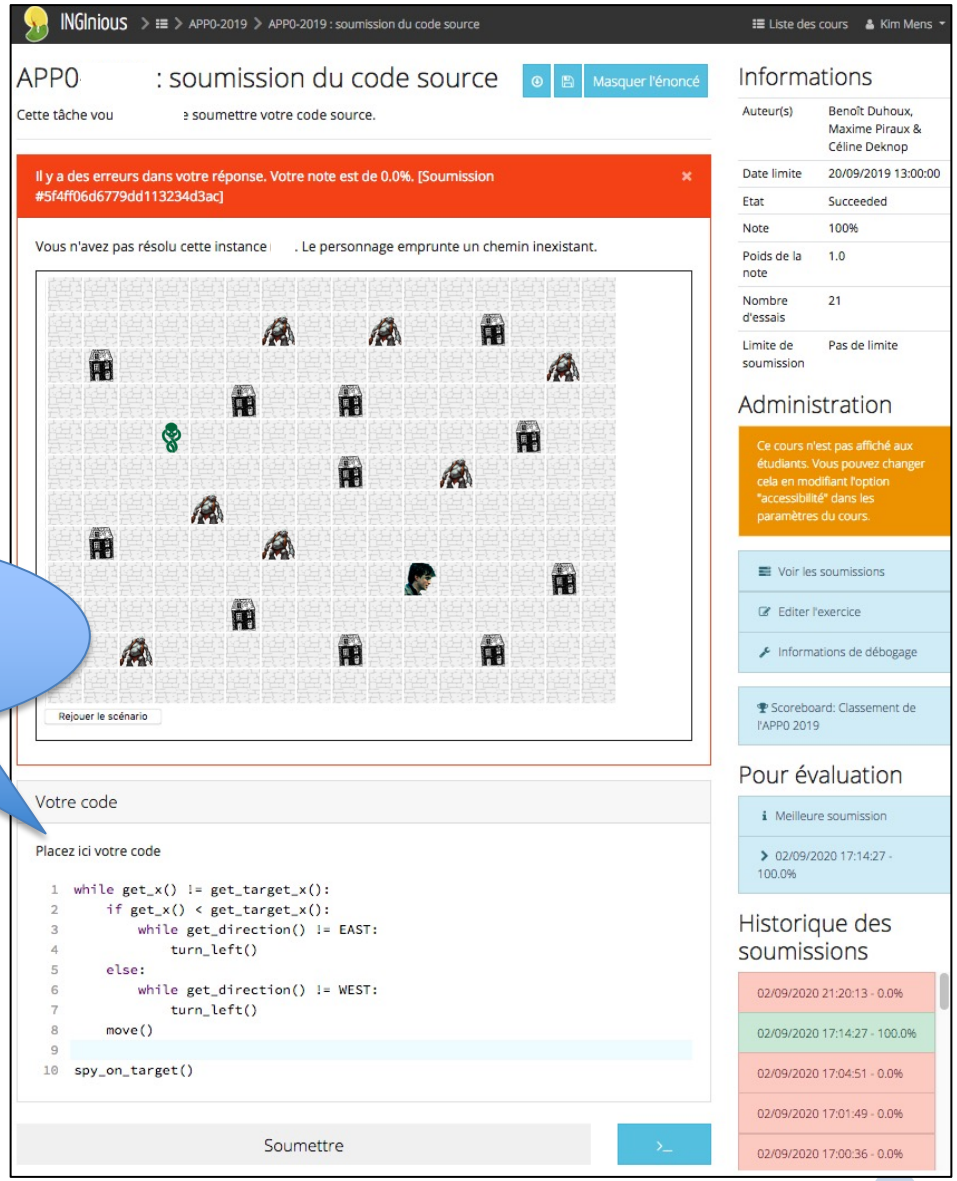


Combiner une boucle et un test

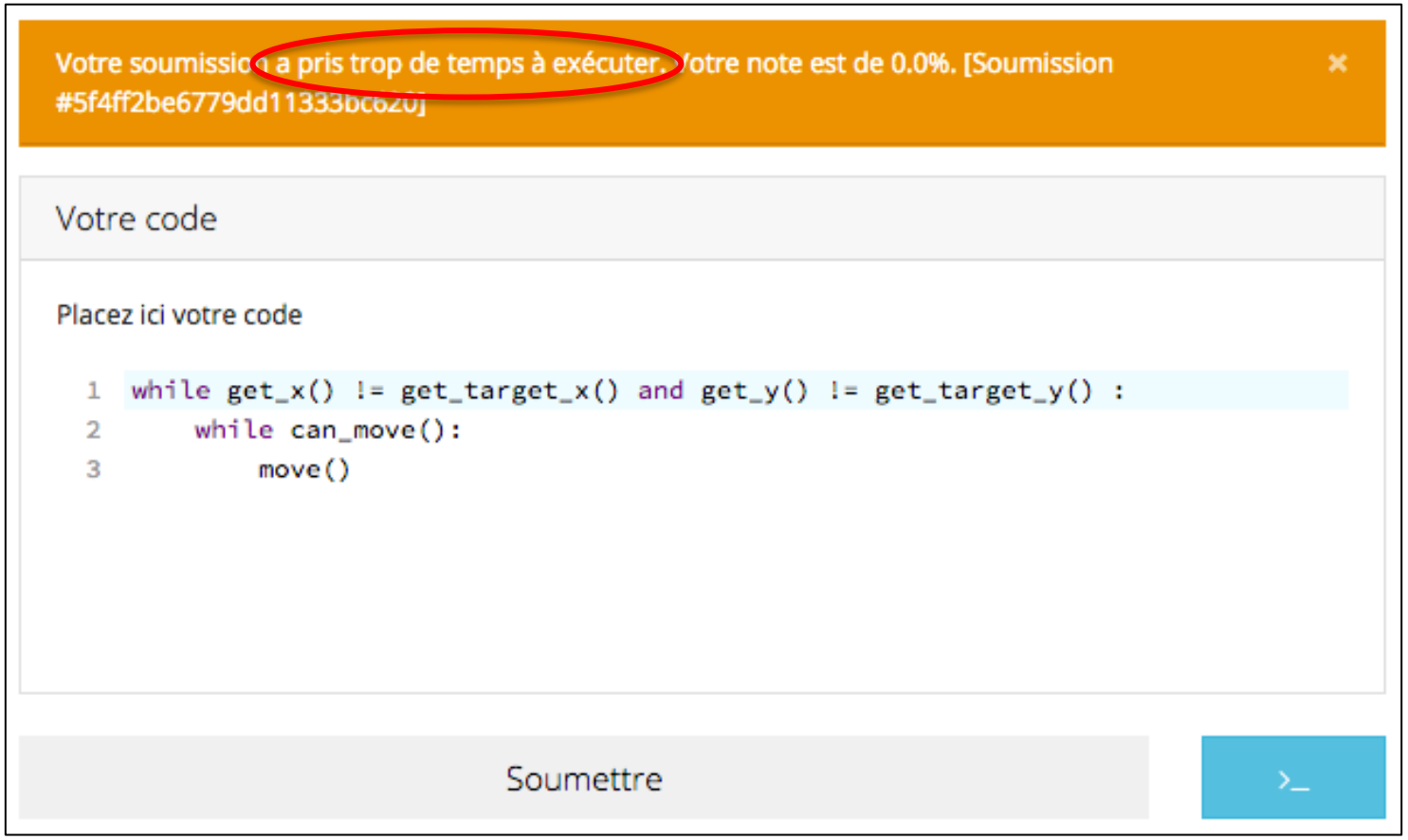
```
while can_move():

    #qqchose


#encoreqqchose
```



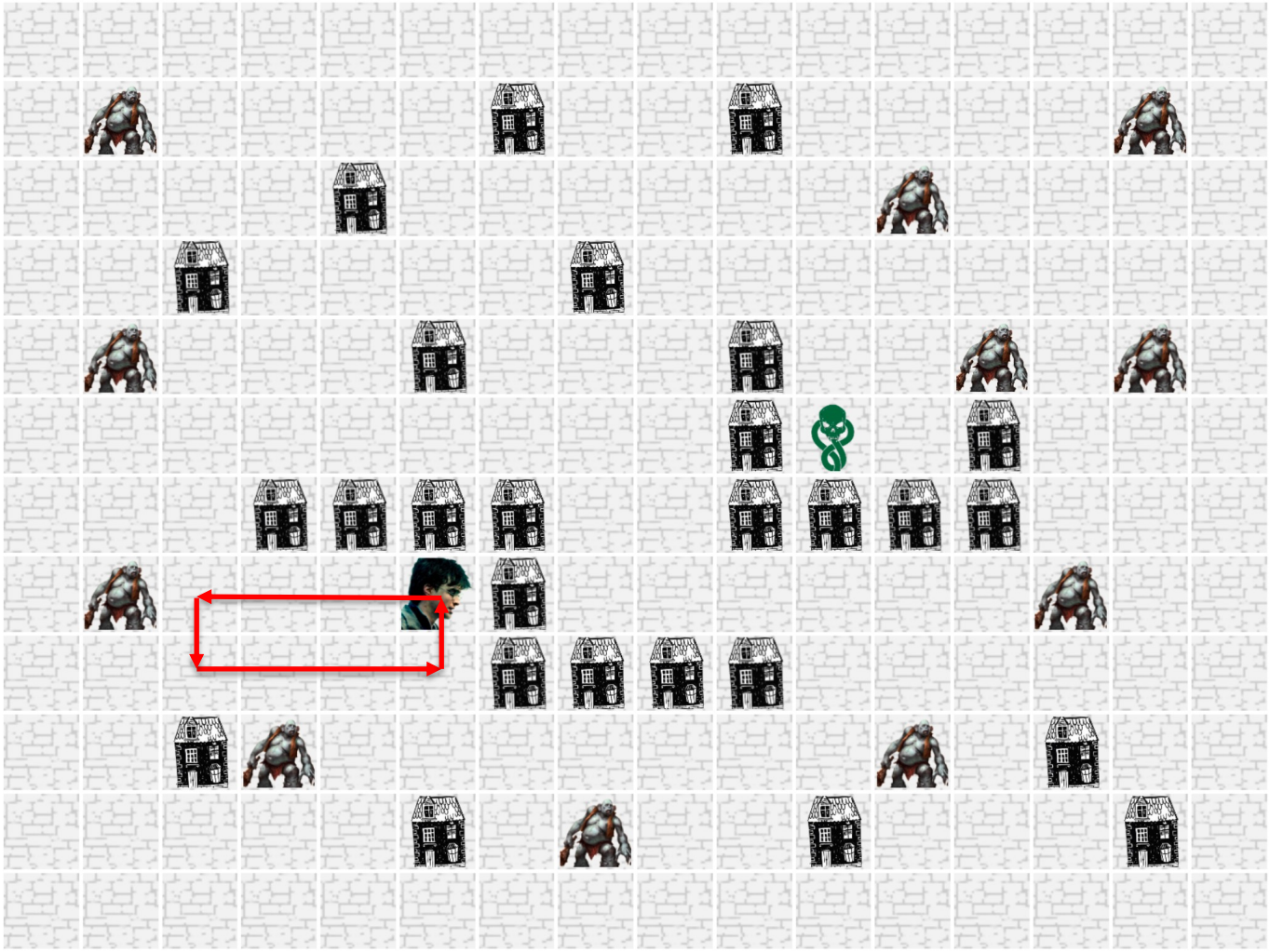
Phase d'implémentation



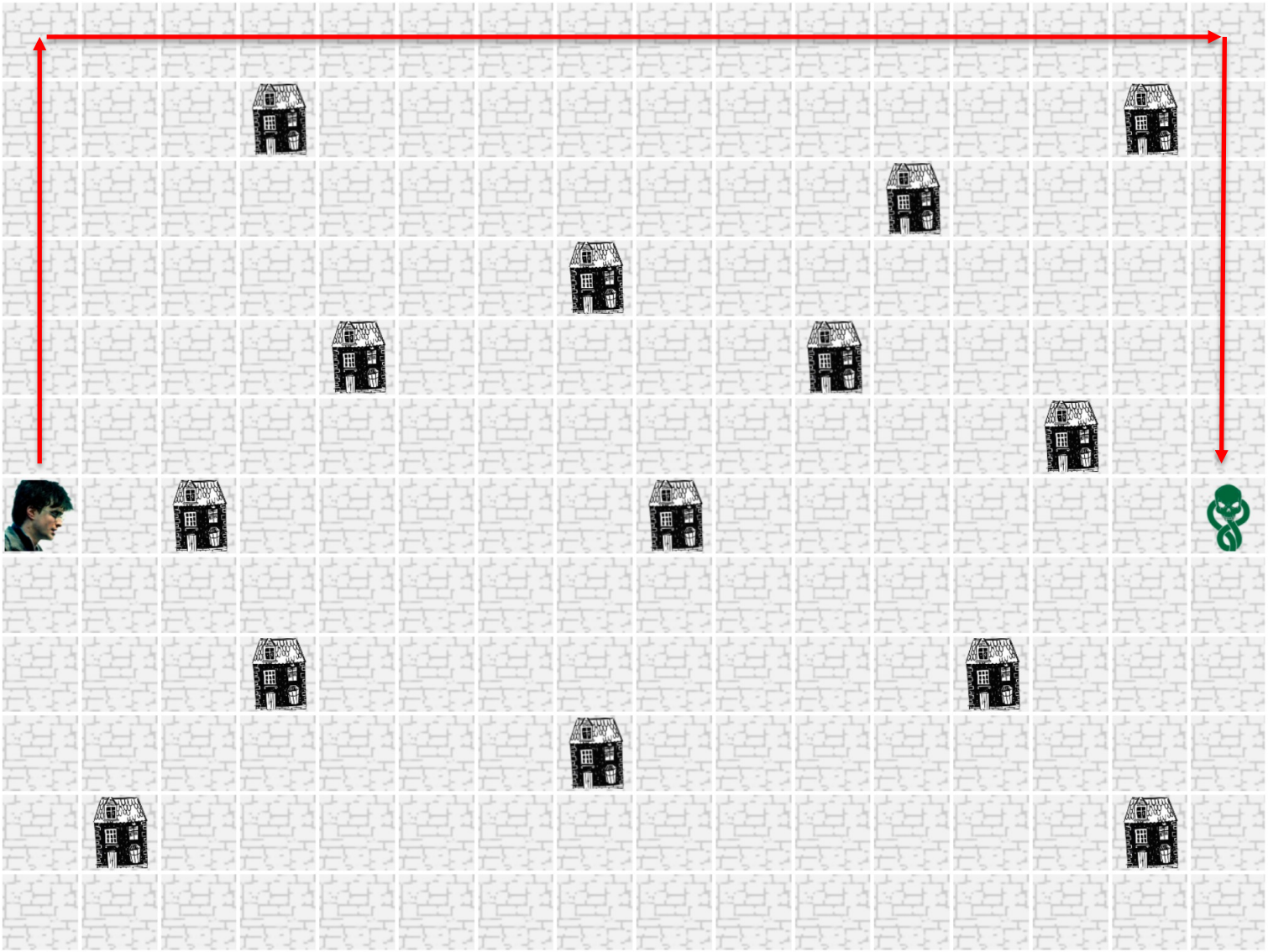
Attention pour les boucles infinies



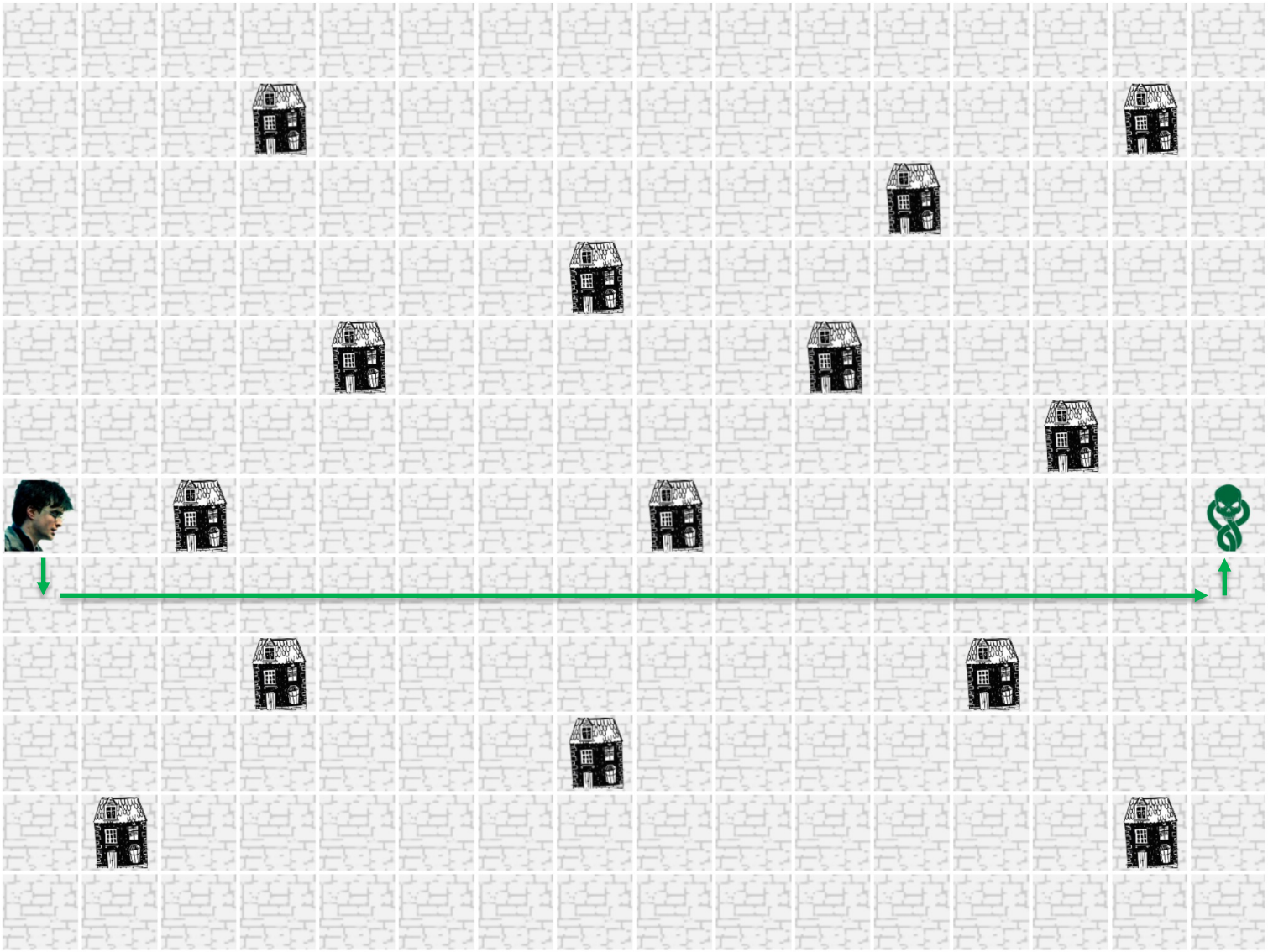
Attention pour les boucles infinies



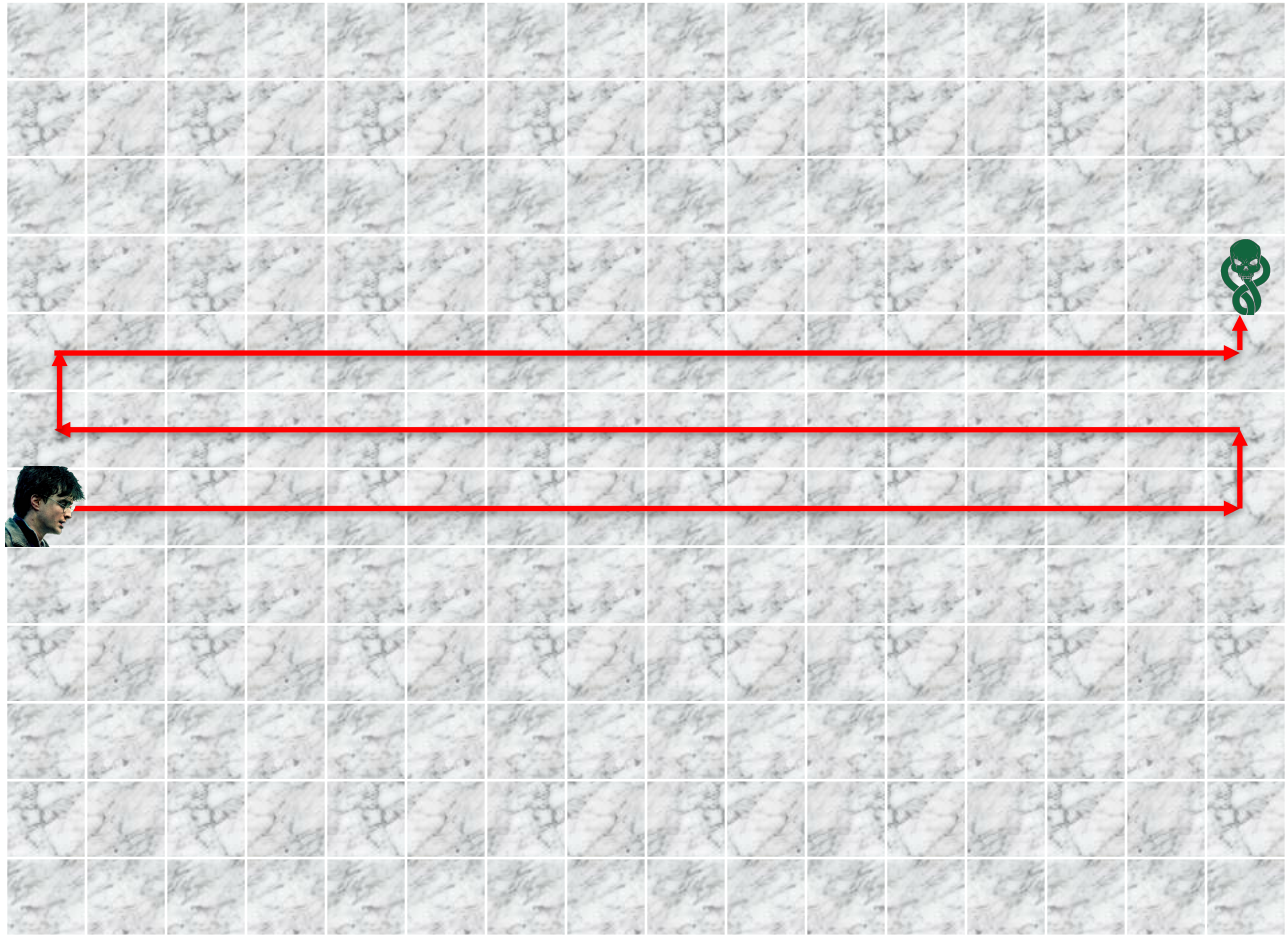
Trouver le chemin le plus court



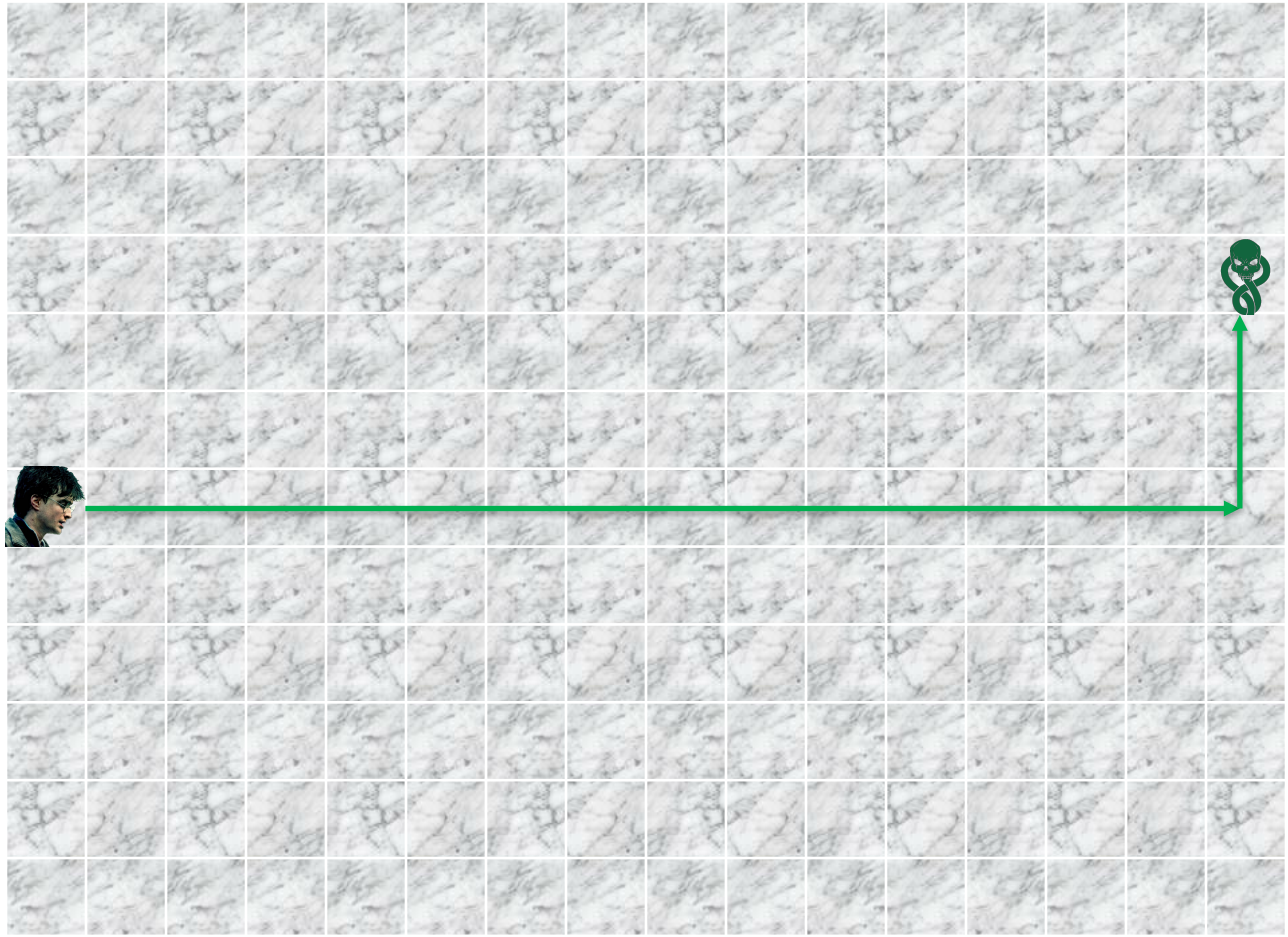
Trouver le chemin le plus court



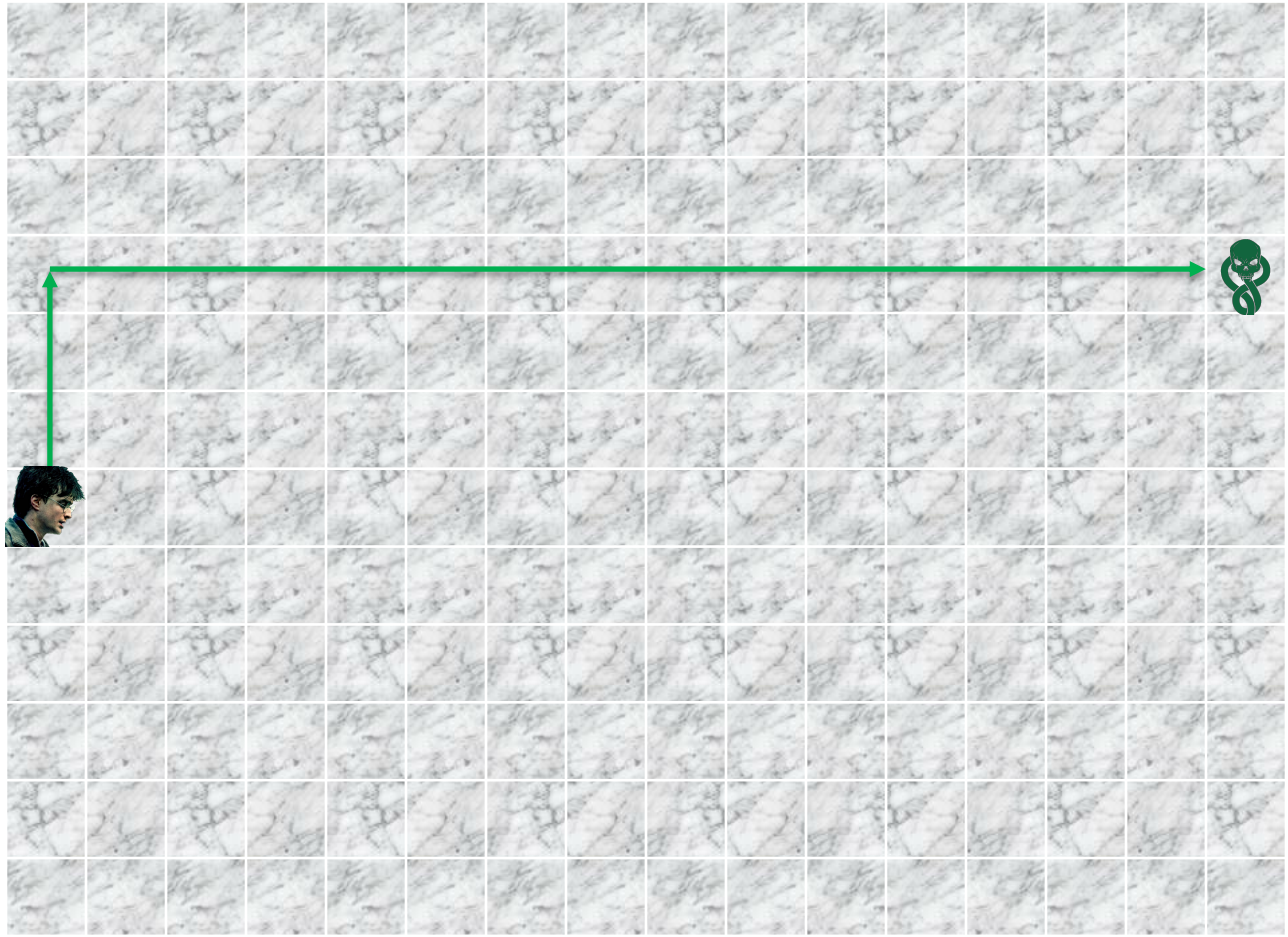
Trouver le chemin le plus court



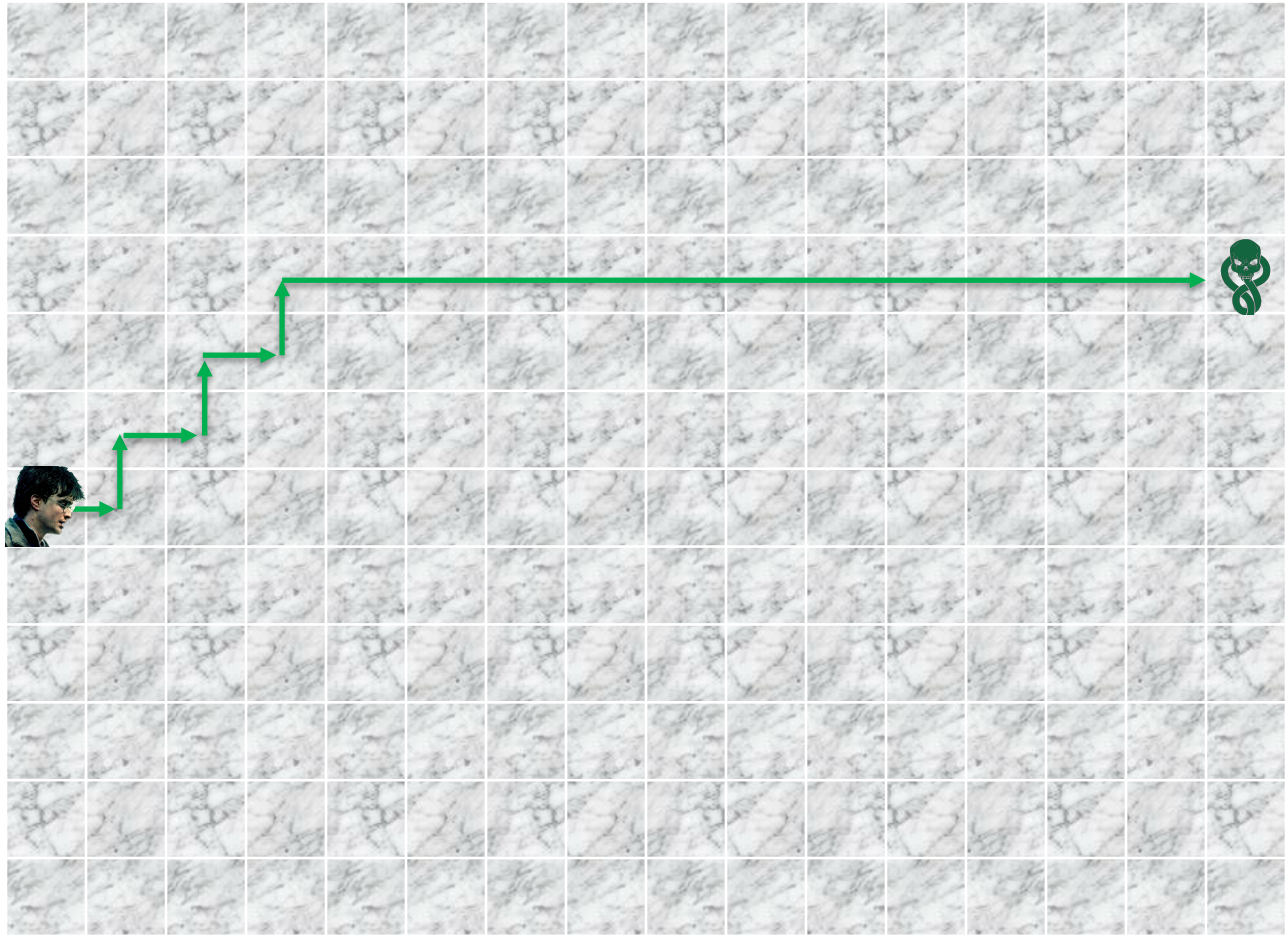
Trouver le chemin le plus court



Trouver le chemin le plus court

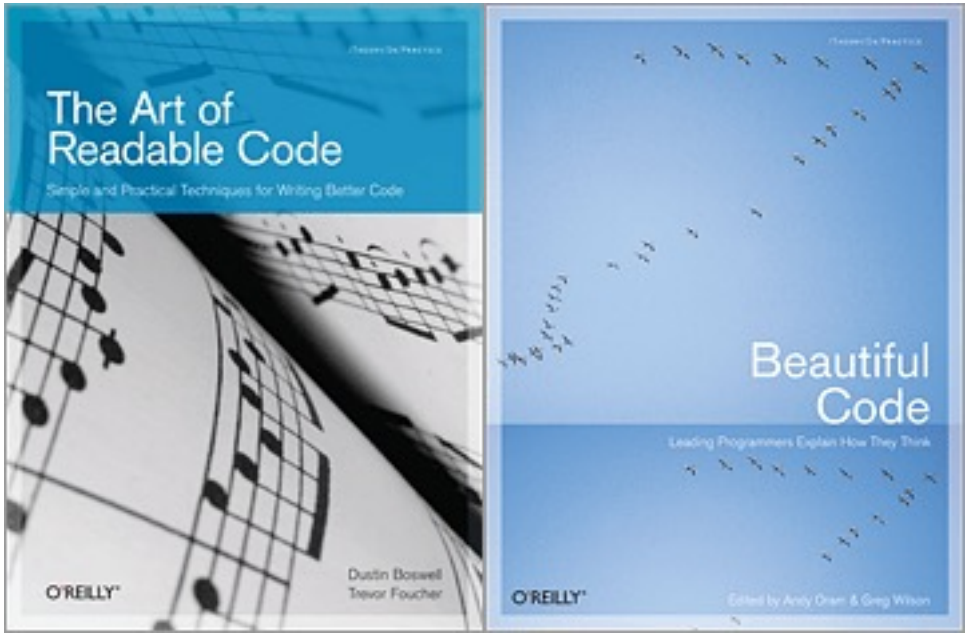


Trouver le chemin le plus court



Quel est votre objectif ?

Des programmes
- Ecrits rapidement
- Denses
- Qui utilisent toutes les astuces du langage



Des programmes
- Corrects
  - Le programme doit résoudre correctement le problème posé (même si celui-ci est simple)
- Clairs
  - Le programme doit être lisible et documenté
- Testés
  - Vous devez pouvoir vérifier les limites de votre programme
- Efficaces
  - p.ex. chemin le plus court

Evitez des programmes trop longs

```
while not is_on_target():
    while get_x() != get_target_x():
        if get_x() > get_target_x():
            while get_x() != get_target_x():
                if get_x() > get_target_x():
                    while get_direction() != WEST:
                        turn_right()
                    if can_move() and not is_in_front_of_wolf():
                        move()
                    else:
                        if get_y() == get_target_y():
                            while not can_move() or is_in_front_of_wolf():
                                turn_right()
                            if can_move() and not is_in_front_of_wolf():
                                move()
                            turn_left()
                        else:
                            turn_left()
                            while not can_move() or is_in_front_of_wolf():
                                turn_left()
                            if can_move() and not is_in_front_of_wolf():
                                move()
                                turn_right()
                            else:
                                turn_left()
                                turn_left()
                                while not get_direction == WEST:
                                    if can_move() and not is_in_front_of_wolf():
                                        move()
                                    turn_left()
                                    if not can_move() or is_in_front_of_wolf():
                                        turn_right()
                                    else:
                                        move()
                                else:
                                    turn_right()
                                    move()
                                    turn_left()
                                    move()
                                    if can_move() and not is_in_front_of_wolf():
                                        while can_move() and not is_in_front_of_wolf():
                                            move()
                                    else:
                                        turn_right()
                                        move()
                                        turn_left()
                                        move()
                                        if can_move() and not is_in_front_of_wolf():
                                            while can_move() and not is_in_front_of_wolf():
                                                move()
                                        turn_left()
                elif get_y() > get_target_y():
                    turn_right()
                    if can_move() and not is_in_front_of_wolf():
                        move()
                    turn_left()
                else:
                    turn_right()
                    while not can_move() or is_in_front_of_wolf():
                        turn_left()
                        if can_move() and not is_in_front_of_wolf():
                            move()
                            turn_right()
                        else:
                            turn_left()
                            move()
                            turn_right()
                            while can_move() and not is_in_front_of_wolf():
                                move()
                    turn_right()
            else:
                turn_left()
                if can_move() and not is_in_front_of_wolf():
                    move()
```

```
        turn_right()
    else:
        turn_right()
        while not can_move() or is_in_front_of_wolf():
            turn_right()
            if can_move() and not is_in_front_of_wolf():
                move()
                turn_left()
            else:
                turn_right()
                move()
                turn_left()
                while can_move() an
                    move()
            turn_left()
else:
    while get_x() != get_target_x():
        if get_x() < get_target_x():
            while get_direction() != EAST:
                turn_right()
            if can_move() and not is_in_fror
                move()
            else:
                if get_y() == get_target_y():
                    while not can_move() or is_
                        turn_left()
                        if can_move() and not is_in_front_of_wolf():
                            move()
                            turn_right()
                        else:
                            turn_right()
                            while not can_move() or is_in_front_of_wolf():
                                turn_right()
                                if can_move() and not is_in_front_of_wolf():
                                    move()
                                turn_left()
                            else:
                                turn_right()
                                turn_right()
                                while not get_direction == EAST:
                                    if can_move() and not is_in_front_of_wolf():
                                        move()
                                    turn_right()
                                    if not can_move() or is_in_front_of_wolf():
                                        turn_left()
                                    else:
                                        move()
                                else:
                                    turn_left()
                                    move()
                                    turn_right()
                                    move()
                                    if can_move() and not is_in_front_of_wolf():
                                        while can_move() and not is_in_front_of_wolf():
                                            move()
                                    else:
                                        turn_left()
                                        move()
                                        turn_right()
                                        move()
                                        if can_move() and not is_in_front_of_wolf():
                                            while can_move() and not is_in_front_of_wolf():
                                                move()
                                        turn_right()
                elif get_y() > get_target_y():
                    turn_left()
                    if can_move() and not is_in_front_of_wolf():
                        move()
                        turn_right()
                    else:
                        turn_right()
                        while not can_move() or is_in_front_of_wolf():
                            turn_right()
                            if can_move() and not is_in_front_of_wolf():
```

```
                move()
            turn_right()
    else:
        turn_left()
        while not can_move() or is_in_front_of_wolf():
            turn_left()
            if can_move() and not is_in_front_of_wolf():
                move()
            else:
                if get_x() == get_target_x():
                    while not can_move() or is_in_front_of_wolf():
                        turn_right()
                        if can_move() and not is_in_front_of_wolf():
                            move()
                        turn_left()
                    else:
                        while not can_move() or is_in_front_of_wolf():
                            turn_left()
                            if can_move() and not is_in_front_of_wolf():
                                move()
                                turn_right()
                            else:
                                turn_right()
                                while not can_move() or is_in_front_of_wolf():
                                    turn_right()
                                    if can_move() and not is_in_front_of_wolf():
                                        move()
                                        turn_left()
                                    else:
                                        turn_right()
                                        turn_right()
                                        while not get_direction == WEST:
                                            if can_move() and not is_in_front_of_wolf():
                                                move()
                                            turn_right()
                                            if not can_move() or is_in_front_of_wolf():
                                                turn_left()
                                            else:
                                                move()
                                        else:
                                            turn_left()
                                            move()
                                            turn_right()
                                            move()
                                            if can_move() and not is_in_front_of_wolf():
                                                while can_move() and not is_in_front_of_wolf():
                                                    move()
                                            else:
```

```
        move()
        turn_left()
    else:
        turn_right()
        move()
        turn_left()
        while not can_move() or is_in_front_of_wolf():
            turn_right()
            if can_move() and not is_in_front_of_wolf():
                move()
                turn_left()
            else:
                turn_right()
                move()
                turn_left()
                while can_move() and not is_in_front_of_wolf():
                    move()
            turn_left()
    else:
        while get_y() != get_target_y():
            if get_y() < get_target_y():
                while get_direction() != NORTH:
                    turn_left()
                if can_move() and not is_in_front_of_wolf():
                    move()
                else:
                    if get_x() == get_target_x():
                        while not can_move() or is_in_front_of_wolf():
                            turn_right()
                            if can_move() and not is_in_front_of_wolf():
                                move()
                            turn_left()
                        else:
                            while not can_move() or is_in_front_of_wolf():
                                turn_left()
                                if can_move() and not is_in_front_of_wolf():
                                    move()
                                    turn_right()
                                else:
                                    turn_right()
                                    while not can_move() or is_in_front_of_wolf():
                                        turn_right()
                                        if can_move() and not is_in_front_of_wolf():
                                            move()
                                            turn_left()
                                        else:
                                            turn_right()
                                            turn_right()
                                            while not get_direction == WEST:
                                                if can_move() and not is_in_front_of_wolf():
                                                    move()
                                                turn_right()
                                                if not can_move() or is_in_front_of_wolf():
                                                    turn_left()
                                                else:
                                                    move()
                                            else:
                                                turn_left()
                                                move()
                                                turn_right()
                                                move()
                                                if can_move() and not is_in_front_of_wolf():
                                                    while can_move() and not is_in_front_of_wolf():
                                                        move()
                                                else:
```

```
        turn_left()
        move()
        turn_right()
        move()
        if can_move() and not is_in_front_of_wolf
            while can_move() and not is_in_front_o
lf():
):
        turn_left()
        while not can_move() or is_in_front_of_wolf():
            turn_left()
            move()
            turn_right()
        move()
        move()
        turn_right()
else:
    while get_y() != get_target_y():
        if get_y() < get_target_y():
            while get_direction() != SOUTH:
                turn_right()
            if can_move() and not is_in_front_of_wolf():
                move()
            else:
                if get_x() == get_target_x():
                    while not can_move() or is_in_front_of_wolf():
                        turn_left()
                        if can_move() and not is_in_front_of_wolf():
                            move()
                            turn_right()
                        else:
                            while not can_move() or is_in_front_of_wolf():
                                turn_left()
                                if can_move() and not is_in_front_of_wolf():
                                    move()
                                    turn_right()
                                else:
                                    turn_right()
                                    while not can_move() or is_in_front_of_wolf():
                                        turn_left()
                                        if can_move() and not is_in_front_of_wolf():
                                            move()
                                            turn_right()
                                        else:
                                            turn_left()
                                            turn_left()
                                            while get_direction != WEST:
                                                if can_move() and not is_in_front_of_wolf
                                                    move()
                                                    turn_left()
                                                    if not can_move() or is_in_front_of_wol
                                                        turn_right()
                                                    else:
                                                        move()
                                                else:
                                                    turn_right()
                                                    move()
                                                    turn_left()
```

Efficacité versus lisibilité

```
while get_direction() != EAST:
    turn_right()
```

Court
Compact
Compréhensible

```
if get_direction == NORTH:
    turn_right()
if get_direction == WEST:
    turn_right()
    turn_right()
if get_direction == SOUTH:
    turn_left()
```

Un peu “plus efficace”
(moins d’operations)

mais beaucoup plus long
et moins compréhensible