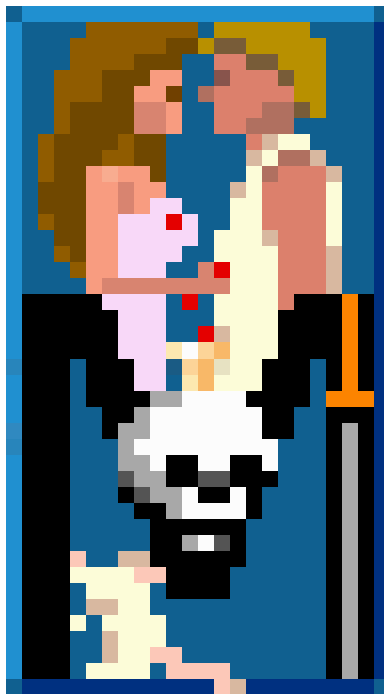


# MININIM 0.10

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The Advanced Prince of Persia Engine (a childhood dream)



Bruno Félix Rezende Ribeiro <[oitofelix@gnu.org](mailto:oitofelix@gnu.org)>

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MININIM is the Advanced Prince of Persia Engine — a childhood dream, the free software implementation of Jordan Mechner’s masterpiece game, developed from scratch by Bruno Félix Rezende Ribeiro ([oitofelix](#)).

This manual is for MININIM version 0.10 (March 01, 2016).

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## Preface

*Menininho* is the Brazilian Portuguese word for *male kid*, and *mininim* is how it's informally pronounced throughout the country. *Kid* is the term used by *Jordan Mechner*<sup>1</sup> when referring to the main character of his most famous game — **Prince of Persia** — in its source code and documentation, because the character's movements were derived from rotoscoping footage of Mechner's little brother. **MININIM** is the *Advanced Prince of Persia Engine*, written from scratch by computer programmer and free software activist *Bruno Félix Rezende Ribeiro* (*oitofelix*). Bruno had a childhood dream of deciphering the secrets of his favorite game that introduced him to computing — a dream dreamt when he was just a kid, a dream realized now that he's still a *mininim* deep in his heart.<sup>2</sup>

MININIM is the Advanced Prince of Persia Engine — a childhood dream, the free software implementation of Jordan Mechner's masterpiece game, developed from scratch by Bruno Félix Rezende Ribeiro (*oitofelix*). *MININIM is free software*; you can redistribute it and/or modify it under the terms of the GNU **GPL** (General Public Licence) as published by the FSF (Free Software Foundation); either version 3, or (at your option) any later version.

In addition to being already a complete replacement for the original game with several improvements, MININIM aims to have detailed documentation on all matters concerning the original Prince of Persia world, ranging from its design concepts to the engine's practical use and development. *MININIM documentation is free*; you can redistribute it and/or modify it under the terms of the GNU **FDL** (Free Documentation Licence) as published by the FSF — with no Invariant Sections; either version 1.3, or (at your option) any later version.

MININIM features various of improvements over the original game, too many to make an exhaustive list here. Some of its noteworthy advantages are:

- Portable to modern operating systems.
- Video, environment, hue and guard modes may be selected on-the-fly.
- Mirror mode (inverts screen and gamepad axis horizontally).
- Joystick mapping and threshold configuration.
- Improved battle system based on upgradable skills, arbitrary number of simultaneous fighters and smarter enemy AI.
- Real-time responsiveness, higher world interaction accuracy and more stable animations.
- New useful movements.
- Volume of sounds based on distance from the source.
- Integrated configuration system using multiple back-ends.
- Capability of loading level files in multiple formats.

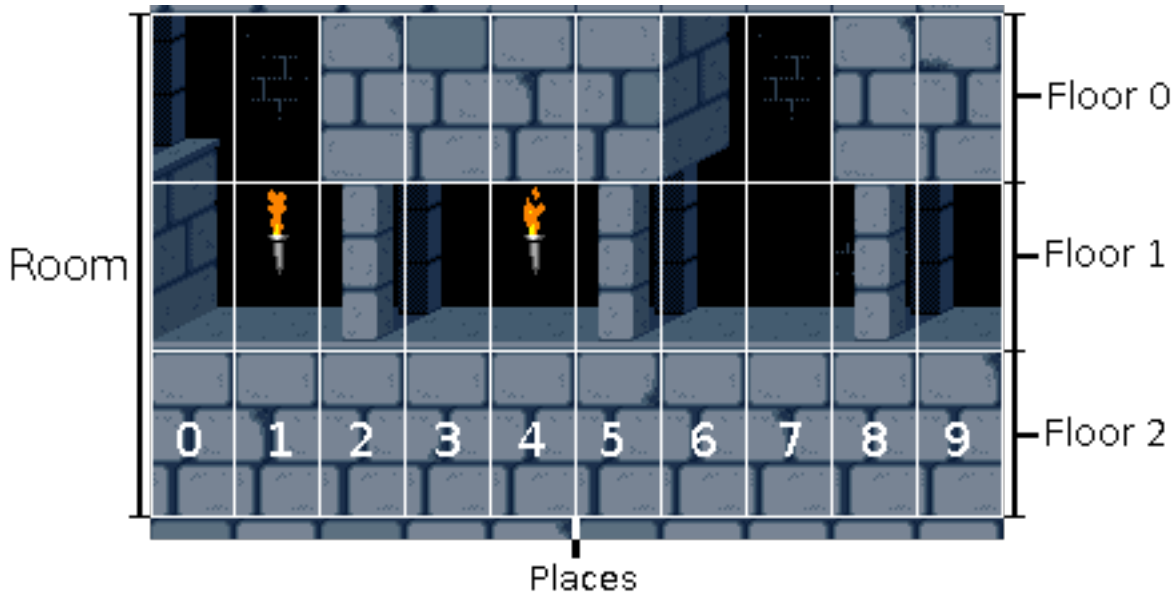
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<sup>1</sup> Jordan Mechner (born June 4, 1964) is an American video game designer, author, screenwriter, and filmmaker, best known for creating the Prince of Persia video game franchise and the 8-bit computer game *Karateka*.

<sup>2</sup> Of course, none of this is reason enough to name a game engine “MININIM”, if not by the fact that it's a really cool palindrome!

# 1 Constructions

Each *level* is comprised of *rooms*<sup>1</sup>. Each room is comprised of three *floors*. Each floor is comprised of 10 *places*. Each place holds a *construction* (or *con* for short).<sup>2</sup> The following figure illustrates this arrangement.



Therefore, any given construction is uniquely identified within a level by the coordinates of its place<sup>3</sup>, which are defined as the triplet *room*, *floor* and *place*:  $(r, f, p)$ .

Constructions are comprised of three elements: *foreground*, *background* and *extension*. A *construction foreground* is the physical part the kid interacts with. Physical properties determined by it are collision, hang and fall conditions, to name a few. On the other hand, a *construction background* is the part that yet visible, doesn't affect the kid in any way — its sole purpose is ornamental; torches and windows are examples of this. A *construction extension* is a modifier which tells how the con looks or behaves. For example, items and door opening states are both expressed by them. Any given construction can have only one extension. The valid extensions are:

- Item* This is a code indicating which item should be put on the construction. Used by FLOOR.
- Can't fall* This is a boolean indicating whether the construction should ignore fall conditions. Used by LOOSE\_FLOOR.
- Event* This is an integer indicating which door event the construction triggers. Used by OPENER\_FLOOR and CLOSER\_FLOOR.

<sup>1</sup> The terminology used for *rooms* in the original game is *screens*.

<sup>2</sup> The terminology used for *constructions* in the original game is *tiles*.

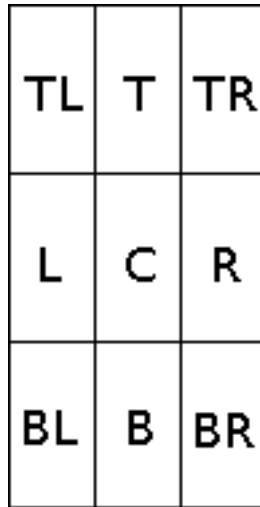
<sup>3</sup> The term *place* is used throughout the text to describe both the last coordinate of the triplet and the world space the triplet refers to. Also, often the term *place* is omitted and the text refers just to the construction itself, implying a reference to its place, as in “the left construction”, meaning “the construction one place to the left”. Hopefully, these shouldn't be a source of ambiguity.

*Step* This is an integer indicating in which state, of a progressive set of configurations, a construction is in. Used by dynamic constructions that don't use other extension.

*Design* This is a code indicating which alternative graphical design should be used to render the construction. Used by carpet constructions.

## 1.1 Non-directed relative positioning

In order to easily talk about the relations between constructions it's necessary to define the *non-directed relative positioning* of a given place to its adjacent ones. Consider the place  $C$ , which has the coordinates  $(r, f, p)$ , and its 8 adjacent places, as shown in the following figure.



TL (top left) T (top) TR (top right) L (left) C (center)  
R (right) BL (bottom left), B (bottom) BR (bottom right)

Then we define the following mapping between names and coordinates:

Name	Coordinates
TL	$(r, f - 1, p - 1)$
T	$(r, f - 1, p)$
TR	$(r, f - 1, p + 1)$
L	$(r, f, p - 1)$
C	$(r, f, p)$
R	$(r, f, p + 1)$
BL	$(r, f + 1, p - 1)$
B	$(r, f + 1, p)$
BR	$(r, f + 1, p + 1)$

## 1.2 Foregrounds

Construction foregrounds have physical properties that determine how they behave in certain events and also how the kid is affected by the interaction with them.



*Strictly traversable*

This property means that the construction can't support the kid vertically at its bottom, thus he falls immediately when trying to rest on it. Notice that cons having this property can't be *hangable*.

*Traversable*

This property means that the construction can't *indefinitely* support the kid vertically at its bottom, thus he *eventually* falls when trying to rest on it. Notice that *strictly traversable* is a particular case of this.

*Collidable* This property means that the construction prevents the kid from passing through it horizontally, thus he collides (often recoiling from the impact) when trying to do so.

*Semi-collidable*

This property means that the construction is *collidable* only under certain circumstances.

*Hangable* This property means that the kid can hang on the construction's bottom, in case there is an *strictly traversable* one at its side.

*Depressible*

This property means that the construction is sensible to pressure at its top, thus some reaction is triggered when the kid exerts such pressure.

*Trap* This property means that the construction might harm the kid.



*Rigid* This property means that the construction can't be smashed by a falling one, thus that which falls stops at the rigid con's top.

*Dynamic* This property means that the construction has a set of distinct states in which it can be in. Such states matter for how the construction looks and behaves.

It's possible that some of these properties may apply only under certain conditions of the construction and/or the kid.

**1.2.1 Floors**

*Floors* make the ground above constructions the kid stands on. All of them are *hangable*, except for NO\_FLOOR.

Code	Dungeon	Palace	Notes
NO_FLOOR <sup>4</sup>			This is an empty space. This is <i>strictly traversable</i> and uses no extension.
FLOOR			This is a normal floor. This uses the <i>item</i> extension.

<sup>4</sup> The *no floor* con is called *empty* in the original game.

BROKEN\_FLOOR<sup>5</sup>

As soon as a falling LOOSE\_FLOOR encounters a *rigid* construction, it disappears replacing the rigid con's top by a BROKEN\_FLOOR. In contrast, if it encounters a *non-rigid* and *non-traversable* construction, it disappears replacing that very con by a BROKEN\_FLOOR. Finally, if it encounters a *non-rigid* but *traversable* construction, it pass through, breaking over the con in case that is not *strictly traversable*. This uses no extension.

SKELETON\_FLOOR

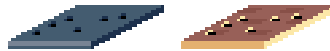


This behaves like FLOOR but uses no extension.

LOOSE\_FLOOR<sup>7</sup>

This is rendered as FLOOR, but shakes as the kid hits the ground, by falling (from above), or vertically jumping (from below). If the kid hits near enough it's released and falls. It might harm the kid when falling over him. This is *traversable*, *depressible*, a *trap*, *dynamic* and uses the *can't fall* extension.

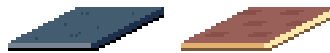
SPIKES\_FLOOR



Spikes come out of it, killing the kid if he falls or steps too fast over it. This is a *trap*, *dynamic* and uses the *step* extension (ranging from 0 to 9). This gets activated as soon as the kid is in the same room and place column, and in the same or higher floor without a wall in between. Guards can activate this as well.

OPENER\_FLOOR<sup>8</sup>

This opens one or more doors. This is *depressible*, *dynamic* and uses the *event* extension.

CLOSER\_FLOOR<sup>9</sup>

This closes one or more doors. This is *depressible*, *dynamic* and uses the *event* extension.

<sup>5</sup> The *broken floor* is called *debris* in the original game.

<sup>6</sup> The original game has no palace version of the skeleton floor.

<sup>7</sup> The *loose floor* is called *loose board* in the original game.

<sup>8</sup> The *opener floor* is called *raise button* in the original game.

<sup>9</sup> The *closer floor* is called *drop button* in the original game.

STUCK\_FLOOR<sup>10</sup>

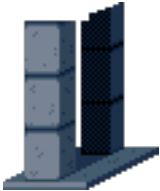

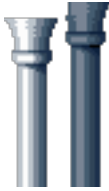

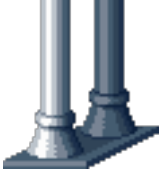
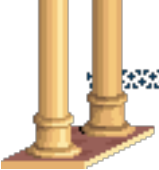


This is rendered like a pressed CLOSER\_FLOOR, but it can't be unpressed. This uses no extension.

HIDDEN\_FLOOR<sup>11</sup>

This is rendered as NO\_FLOOR, but as soon as the kid presses it, it's replaced by FLOOR. This is *depressible* and uses no extension.

## 1.2.2 Pillars

*Pillars* are aesthetic supports for the constructions on the floor above them. All of them are *hangable*, except for BIG\_PILLAR\_TOP. Pillars use no extension.



Code	Dungeon	Palace	Notes
PILLAR			This is <i>rigid</i> .
BIG_PILLAR_TOP			This should be placed above a BIG_PILLAR_BOTTOM. This is <i>strictly traversable</i> and <i>rigid</i> .
BIG_PILLAR_BOTTOM			This should be placed below a BIG_PILLAR_TOP.
ARCH_BOTTOM			This should be placed below an ARCH_TOP_MID.

<sup>10</sup> The *stuck floor* is called *stuck button* in the original game.

<sup>11</sup> The original game doesn't have a HIDDEN\_FLOOR construction by itself.

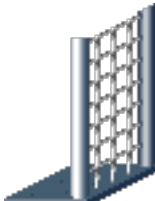
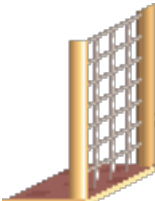


### 1.2.3 Wall

The *wall* is a solid construct that separates sections of the level. It's *collidable*, *rigid* and uses no extension.

Code	Dungeon	Palace
WALL		

### 1.2.4 Doors

*Doors* are constructions that conditionally separate levels and in-level sections. Both door types are *hangable*, *dynamic* and use the *step* extension. The extension determines the door opening level, ranging from fully open (0) to fully closed.

Code	Dungeon	Palace	Notes
DOOR <sup>12</sup>			This is <i>semi-collidable</i> at right, as the kid might pass or not through it depending on the difference of the grid tip height and kid's movement height. This is <i>rigid</i> and its <i>step</i> extension range from 0 to 47.
LEVEL_DOOR <sup>13</sup>			Often the kid progress through levels entering these. This can only be entered when fully open. Its <i>step</i> extension range from 0 to 43.

### 1.2.5 Chopper

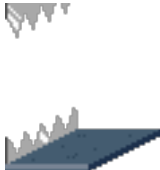
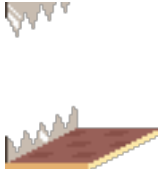
The *chopper*<sup>14</sup> can leave the kid in half. It's a *trap*, *hangable at right*, *rigid* and *dynamic*. It uses the *step* extension which range from 0 to 4 and 128 to 132 (bloody counterpart).

<sup>12</sup> The *door* is called *gate* in the original game.

<sup>13</sup> The *level door* is called simply *exit* in the original game. There it's divided into two constructions: *exit left* and *exit right*.



<sup>14</sup> The *chopper* is called *chomper* in the original game.

It gets activated as soon as the kid is in the same room and floor and there is no wall in between. It doesn't get activated by guards, but can kill them as well. The chopper nullifies the *hangable at left* property of its top construction.

Code	Dungeon	Palace
CHOPPER		

### 1.2.6 Mirror

The *mirror* reflects the kid's image and prevents him from passing through, except if he is able to perform a running jump, whatever the side. It's *semi-collidable* at left, *hangable at right*, *rigid* and uses no extension. The mirror nullifies the *hangable at left* property of its top construction.

Code	Dungeon	Palace
MIRROR		

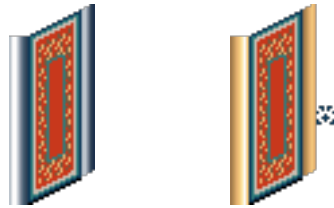
### 1.2.7 Carpets

*Carpets*<sup>15</sup> are ornamental constructions often placed over DOOR cons. They come in two flavors: CARPET and TCARPET; the watershed difference being the *traversable* property, which the latter has but the former lacks. Both are *collidable* at right, *rigid* and make use of the *design* extension. The CARPET construction is also *hangable at left*. Also, carpets nullify the *hangable at left* property of their *right* and *top right* constructions.

Code	Dungeon	Palace	Notes
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<sup>15</sup> *Carpets* are called *tapestry* in the original game.

TCARPET



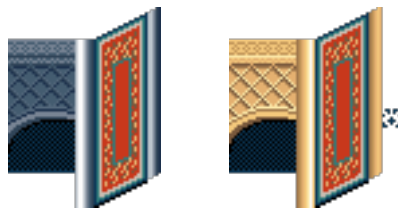
These graphics are drawn for the *design* CARPET\_00.

TCARPET



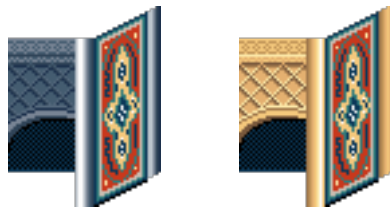
These graphics are drawn for the *design* CARPET\_01.

TCARPET



These graphics are drawn for the *design* ARCH\_CARPET\_RIGHT\_00. This is intended to end an arch. This should be placed at right of an ARCH\_TOP\_MID.

TCARPET



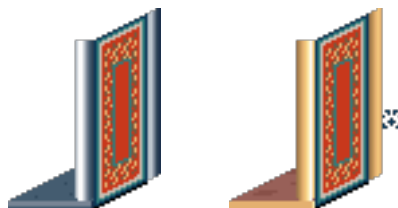
These graphics are drawn for the *design* ARCH\_CARPET\_RIGHT\_01. This is intended to end an arch. This should be placed at right of an ARCH\_TOP\_MID.

TCARPET



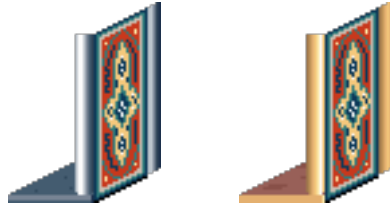
These graphics are drawn for the *design* ARCH\_CARPET\_LEFT. This is intended to end an arch. This should be placed two places to the left of an ARCH\_TOP\_MID.

CARPET



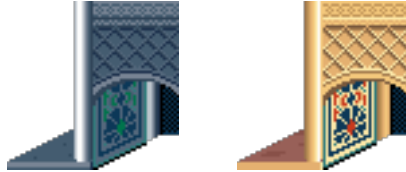
These graphics are drawn for the *design* CARPET\_00.

CARPET



These graphics are drawn for the *design* CARPET\_01.







CARPET



These graphics are drawn for the design ARCH\_CARPET\_LEFT. This is intended to end an arch. This should be placed two places to the left of an ARCH\_TOP\_MID.

### 1.2.8 Arches

*Arches*<sup>16</sup> are ornamental constructions that can be indefinitely chained together to make a structure that spans several rooms across. They are *strictly traversable*, *rigid* and use no extension.

Code	Dungeon <sup>17</sup>	Palace	Notes
ARCH_TOP_MID			This should be placed above an ARCH_BOTTOM and at left of an ARCH_TOP_LEFT, at right of an ARCH_TOP_RIGHT, or next to an ARCH_TOP_SMALL.
ARCH_TOP_SMALL			This should be placed in between two ARCH_TOP_MID.
ARCH_TOP_LEFT			This should be placed at left of an ARCH_TOP_RIGHT.

<sup>16</sup> *Arches* are called *lattices* in the original game.

<sup>17</sup> In the original game there is no dungeon version of arches.

ARCH\_TOP\_RIGHT



This should be placed at right of an ARCH\_TOP\_LEFT.

### 1.3 Backgrounds

Any combination of construction background and foreground is allowed, but be aware that some may simply not look right, or even not make a difference at all (like a torch behind a wall).

Code	Dungeon	Palace	Notes
NO_BRICKS			For the dungeon and palace this results in no graphics at all.
NO_BG			For the dungeon this results in no graphics. For the palace this results in the same graphics as BRICKS_02.
BRICKS_00			For the palace this results in no graphics.
BRICKS_01			For the palace this results in the same graphics as BRICKS_03
BRICKS_02			For the palace this results in the same graphics as NO_BG.
BRICKS_03			For the palace this results in the same graphics as BRICKS_01.
TORCH <sup>18</sup>			

<sup>18</sup> The fire sprites are mirrored horizontally depending on the level coordinates the torch has. This is not so in the original game.








WINDOW

BALCONY<sup>19</sup>

## 1.4 Items

The item extension is used only by FLOOR. Items are placed over the floor construction they belong to and animated. They can be caught by the kid by pressing the shift key.

Code	Graphics	Notes
NO_ITEM		This results in no graphics at all.
EMPTY_POTION		This potion has no bubbles and no effect.
SMALL_LIFE_POTION		This potion has red bubbles and recovers one life point.
BIG_LIFE_POTION		This potion has red bubbles, adds one life point container and recover all life points.
SMALL_POISON_POTION		This potion has blue bubbles and takes one life point. It has the same graphics as ACTIVATION_POTION.
BIG_POISON_POTION <sup>20</sup>		This potion has blue bubbles and takes all life point, effectively killing the kid.

<sup>19</sup> The background stars are randomly positioned and animated. In the original game, all balconies have non-animated white stars in fixed positions.

<sup>20</sup> The big poison potion is not available in the original game.

FLOAT\_POTION



This potion has green bubbles and allows the kid to levitate, effectively making long falls harmless.

FLIP\_POTION



This potion has yellow bubbles and flips the screen horizontally, vertically or both, depending on its level coordinates.<sup>21</sup> Drinking another one undo this effect.

ACTIVATION\_POTION



This potion has the same graphics as `SMALL_POISON_POTION` and is used to activate a construction.<sup>22</sup>

SWORD<sup>23</sup>

This allows the kid to enter fight mode. The sword blinks from time to time.

---

<sup>21</sup> In the original game, flip potions only invert the screen vertically and are drawn as `FLOAT_POTION`, that is, with green bubbles.

<sup>22</sup> In the original game the *activation potion* is designed to be used in the potion level, a copy protection mechanism employed to stop people from sharing. **MININIM is free software**, and we repudiate this kind of measure. Thus here *activation potions* may be used to handicap the kid, but certainly won't be used to do so to you nor to your friends.

<sup>23</sup> The sword graphics is mirrored horizontally depending on its level coordinates. This is not so in the original game.

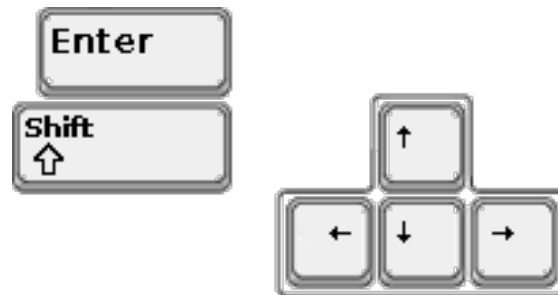
## 2 Movements

In his journey to save the princess, the kid has to endure several levels full of challenging traps and skilled opponents. Run, walk, turn, crouch, jump, hang, climb, take the sword, attack and defend are some of the kid's movements at your disposal to make the way to the princess tower. Although, this is a relatively large set of movements, basically all these are accomplished by some combination of the directional and shift keys, often conditioned to the current kid's state. This chapter explains in detail all possible movements of the kid.

There are six modes of movement: *normal*, *crouch*, *run*, *hang*, *fall* and *fight*. The mode the kid is in is the foremost element determining how the input is translated into kid's movements.

Notice that (whenever it makes sense) for any move, holding its triggering keys continues or repeats the movement.<sup>1</sup> Often, when transitioning from a movement to another that share some keys, you can keep the common keys pressed, as well as any other keys ignored by an intermediate movement, and the kid will just do the right thing. It's also worth nothing that the kid responds to the input in real time, that is, in the next animation cycle.<sup>2</sup>

*FRONT* and *BACK* are meta-keys used to refer to *LEFT* and *RIGHT* conditionally subject to kid's facing direction. The *UP*, *DOWN*, *SHIFT* and *ENTER* keys are simply referred as such. The following figure illustrates how these keys appear in a common keyboard.



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<sup>1</sup> That's not so for the original game, in which for many situations you have to release and press the keys again to have the movement repeated.

<sup>2</sup> That's not so for the original game, in which the kid delays one cycle to respond.

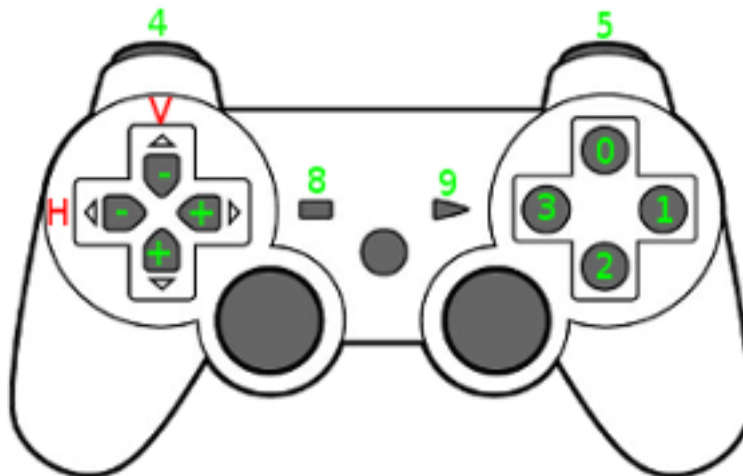
## 2.1 Alternative gamepads

The classic numeric keypad controls, described in the original game's manual, may be used. Its mapping is shown in the following figure.



*ENTER (ENTER) 4 (LEFT) 8 (UP) 6 (RIGHT) 5, 2 (DOWN)  
7 (LEFT + UP) 9 (RIGHT + UP) 1 (LEFT + DOWN) 3 (RIGHT + DOWN)*

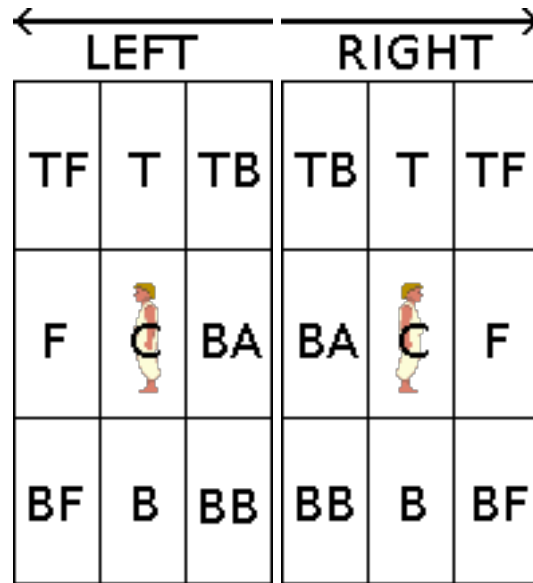
You can also use a joystick to control the kid. After hot-plugging the joystick in, make sure the axes are centered and no button is pressed, then press *CTRL+J* to enable and auto-calibrate your joystick on-the-fly. The figure below shows the default assumed joystick layout. If for some reason your joystick doesn't work with this mapping or you want to modify the default mapping, use the `--joystick-axis` and `--joystick-button` options. In case your joystick starts to behave oddly, press *CTRL+J* again to re-calibrate it. If the kid continues to perform spurious movements, the options `--joystick-axis-threshold` and `--joystick-button-threshold` may help. See [Section 4.6 \[Gamepad options\]](#), page 34.



*H- (LEFT) H+ (RIGHT) V- (UP) V+ (DOWN)  
0 (UP) 1 (RIGHT) 2 (DOWN) 3 (LEFT) 4 (ENTER) 5 (SHIFT) 8 (TIME) 9 (PAUSE)*

## 2.2 Directed relative positioning

The concept of *directed relative positioning*, necessary to easily describe the relations between constructions and the kid is analogous to the already defined concept of *non-directed relative positioning*, used to describe relations between constructions. Consider the kid's place  $C$ , which has the coordinates  $(r, f, p)$ , its 8 adjacent places and the direction the kid is facing, as shown in the following two figures.



**TF** (top front) **T** (top) **TB** (top back) **F** (front) **C** (center)  
**BA** (back) **BF** (bottom front), **B** (bottom) **BB** (bottom back)

Then we define the following mapping between names and coordinates:

<b>Left</b>	<b>Right</b>	<b>Coordinates</b>
TF	TB	$(r, f - 1, p - 1)$
T	T	$(r, f - 1, p)$
TB	TF	$(r, f - 1, p + 1)$
F	BA	$(r, f, p - 1)$
C	C	$(r, f, p)$
BA	F	$(r, f, p + 1)$
BF	BB	$(r, f + 1, p - 1)$
B	B	$(r, f + 1, p)$
BB	BF	$(r, f + 1, p + 1)$

## 2.3 Hangable place

Quite a few movements might culminate in the kid hanging on a construction. In order to describe the conditions in which that may happen, it's necessary to define the concept of *hangable place*.

**Hangable place:** we say the kid's place is *hangable*, if (and only if) its top construction is *strictly traversable* and its top front one is *hangable* in the opposite direction.

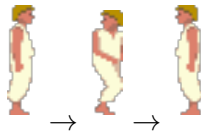
## 2.4 Normal

The movement mode at the beginning of each level is *normal*. While in it the kid is standing still.



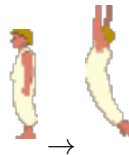
### 2.4.1 Turn

If you press *BACK*, the kid turns and then faces the opposite direction likewise.



### 2.4.2 Vertical jump

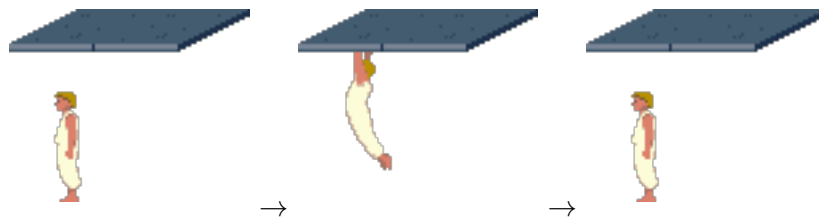
Pressing *UP*, makes the kid perform a vertical jump.



In case his *top construction* is *strictly traversable* but he isn't in a *hangable place*, he performs a long vertical jump and comes back to the **exact** same position he was before the jump.<sup>1</sup>

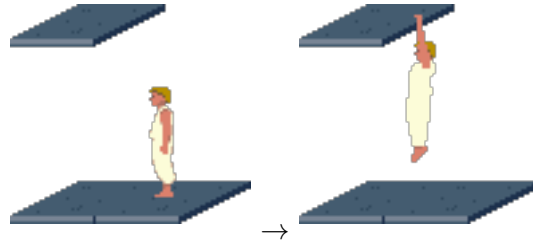


In case his *top construction* is not *strictly traversable* and his *back place* is not *hangable*, he performs a short vertical jump and then comes back to the exact same position he was before the jump.

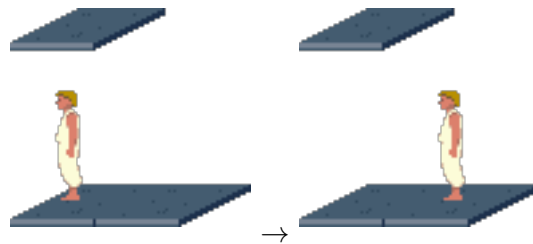


<sup>1</sup> This is not so in the original game, where he moves a little bit forward at each vertical jump.

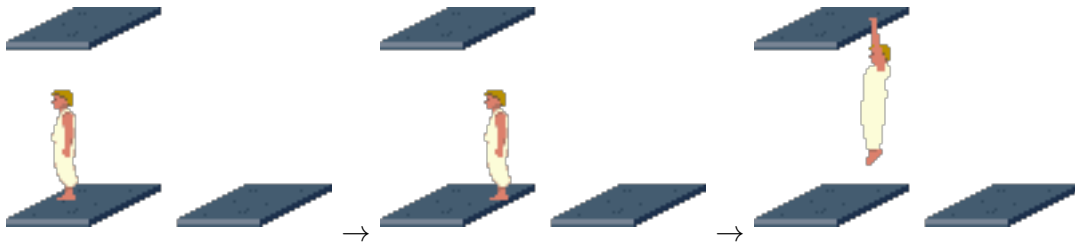
In case he's in a *hangable place*, he performs a long vertical jump (after coming close enough to the edge if he isn't already) and hangs for a brief period of time.



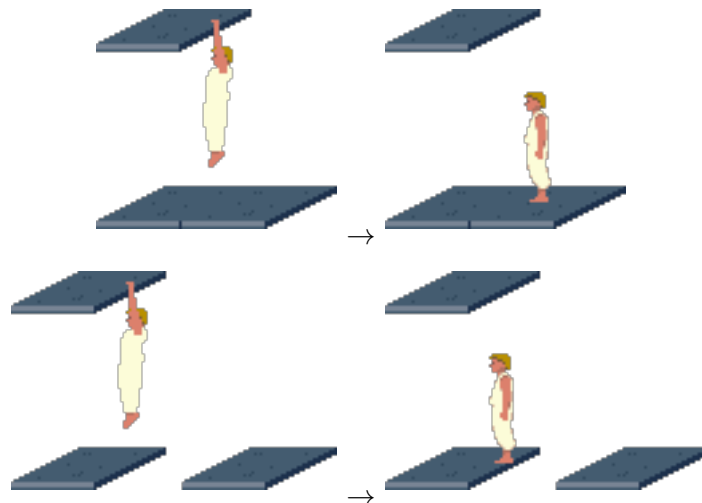
In case his *back place* is *hangable* and *non-strictly traversable*, he backs off so the situation fits the previous paragraph description.



In case his *back place* is *hangable* but *strictly traversable*, he backs off just enough, without entering the *strictly traversable* place, to perform a very vertical jump, and then hangs as described.

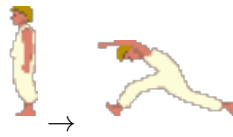


If holding *SHIFT*, the kid enters *hang mode*, otherwise he just drops back to the ground.

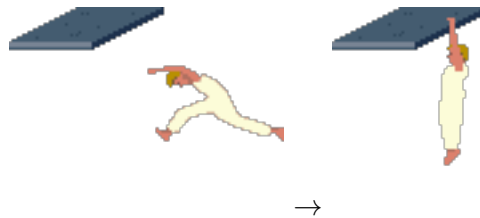


### 2.4.3 Normal jump

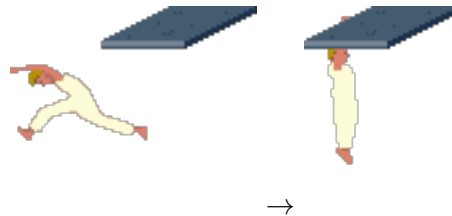
Pressing *UP* and *FRONT* at once makes the kid jump forward. He can jump over (up to) two *places* across without falling.



In midair, if he's in a *hangable place*, holding *SHIFT* and pressing *FRONT* makes him hang on the construction and enter *hang mode*.<sup>2</sup>



If he's in a *hangable place* for the opposite direction, holding *SHIFT* and pressing *BACK* makes him turn in midair, hang on the construction and enter *hang mode*.<sup>3</sup>

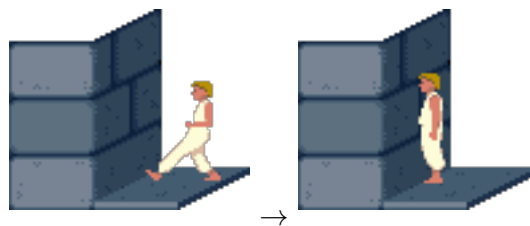


### 2.4.4 Walk

Pressing *FRONT* while holding *SHIFT*, makes the kid walk carefully.



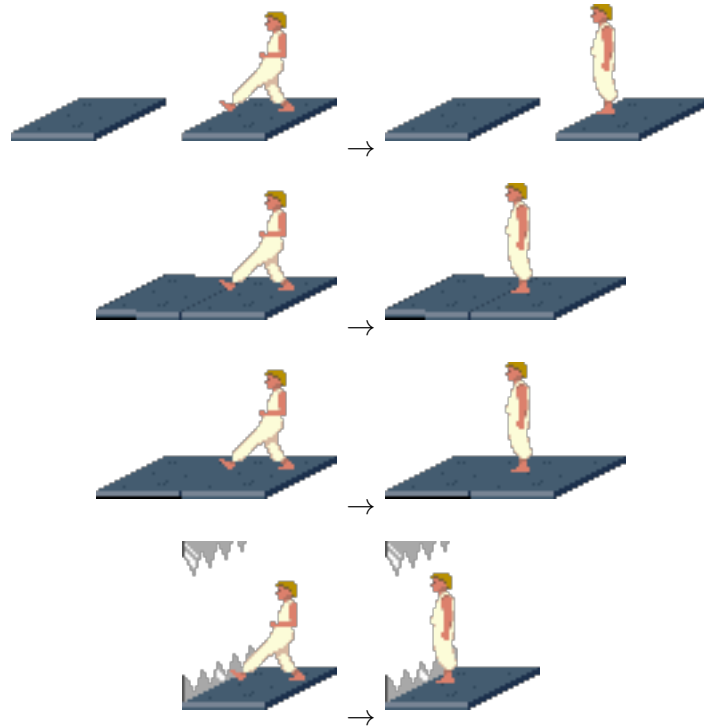
He always safely stops before a collision, fall, loose floor, closer floor and chopper blade.



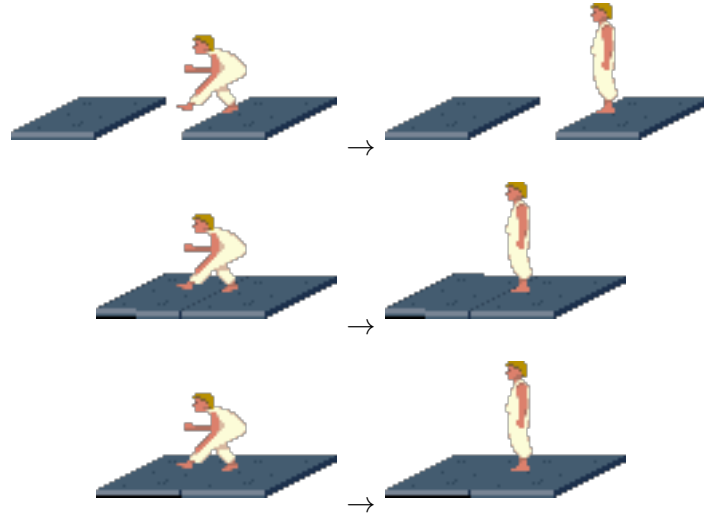
<sup>2</sup> The original game has no such movement.

<sup>3</sup> The original game has no such movement.





If the kid is just before a *traversable* construction or a closer floor<sup>4</sup>, he misstep and gets back to his original position, as a warning of the eminent danger.

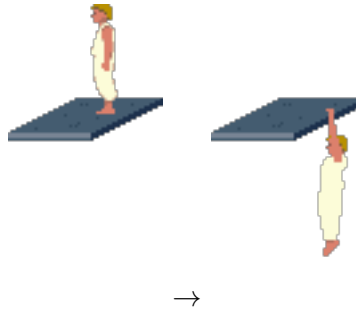


If you insist, he'll obey and suffer the consequences — so, be careful!

### 2.4.5 Descend

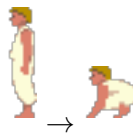
If you press *DOWN* and the kid's *bottom back place* is *hangable* and he's near enough to it, he descends, then hangs briefly — entering *hang mode* if *SHIFT* is kept pressed, or dropping off otherwise.

<sup>4</sup> The kid doesn't misstep for a closer floor in the original game.

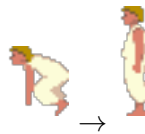


## 2.5 Crouch

If you press *DOWN* and the kid's *bottom back place* is *non-hangable*, or the kid is not near enough to it, he crouches.

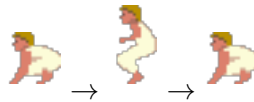


The kid stays crouched as long as you keep *DOWN* pressed. Releasing it makes him stand up again.



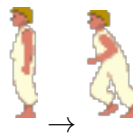
### 2.5.1 Crouching jump

If you press *FRONT* without releasing *DOWN*, the kid performs little crouching jumps forward.

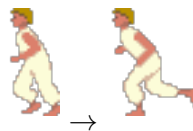


## 2.6 Run

Pressing *FRONT*, makes the kid start to run.<sup>5</sup>

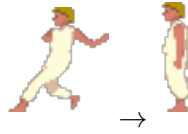


He runs as long as you keep *FRONT* pressed.



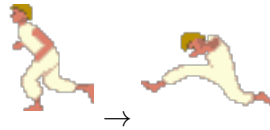
<sup>5</sup> Unless he is facing a *collidable* construction with at most one place of distance, in which case he performs a *walk*. Notice that in the original game the threshold is lower.

Releasing it makes him stop, and go back to the normal stage.

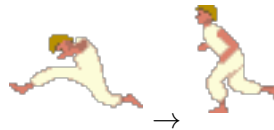


### 2.6.1 Running jump

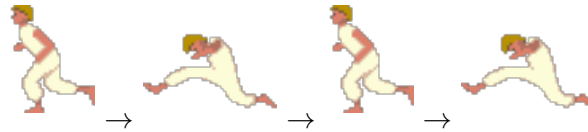
In case you press *UP* while running, the kid performs a running jump. The running jump has a reach greater than the *normal jump*. The kid can jump over (up to) three *places* across without falling.



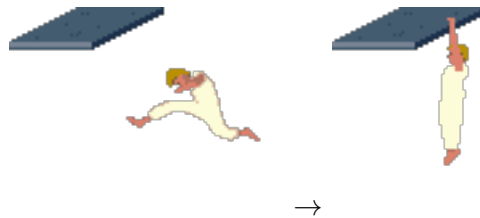
When the kid lands on ground, he continues to run if you keep *FRONT* pressed.



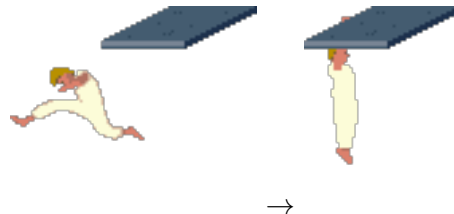
This implies that, if you keep both keys pressed the movement repeats indefinitely.



In midair, if he's in a *hangable place*, holding *SHIFT* and pressing *FRONT* makes him hang on the construction and enter *hang mode*.<sup>6</sup>



If he's in a *hangable place* for the opposite direction, holding *SHIFT* and pressing *BACK* makes him turn in midair, hang on the construction and enter *hang mode*.<sup>7</sup>

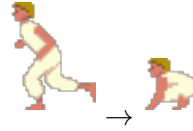


<sup>6</sup> The original game has no such movement.

<sup>7</sup> The original game has no such movement.

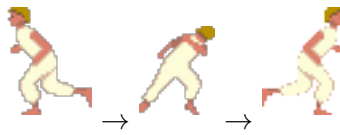
### 2.6.2 Running crouch

If you press *DOWN* while running, he crouches, slipping with some momentum, and then he enters *crouch mode*.



### 2.6.3 Running turn

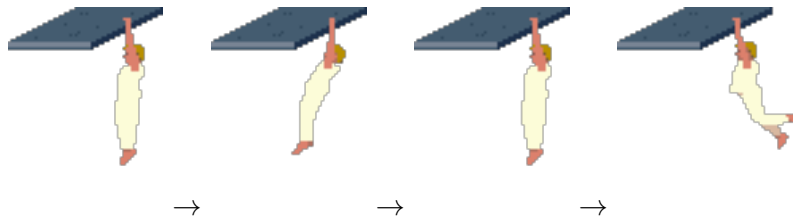
If you press *BACK* while running, the kid turns without stopping and continues to run in the opposite direction if you keep it pressed.



## 2.7 Hang

There are two modes of hanging: *free* and *non-free*. The kid *hangs free* when his *front construction* is not collidable in the direction of hanging. Otherwise he *hangs non-free*.

While *hanging free* the kid swings back and forth like a pendulum.



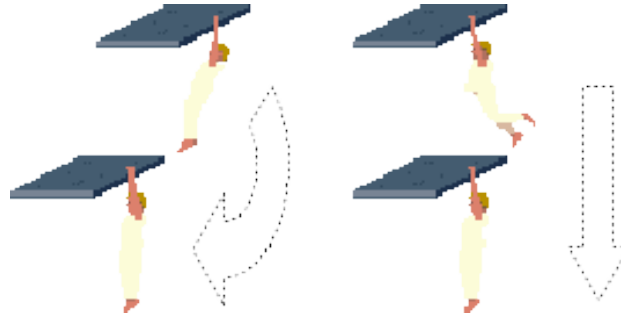
By contrast, when *hanging non-free* the kid keeps himself static.



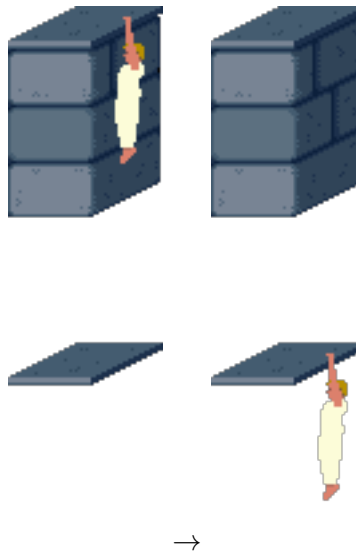
### 2.7.1 Hanging fall

When *hanging free*, there is a limit for how much time the kid can support his own weight, after which he drops from the construction. Releasing *SHIFT* in the meantime has the same effect. The kid will fall either aligned with the *hangable place's column* or with the *hangable place's front column*, depending upon which his feet are in when he leaves the hanged construction.<sup>8</sup>

<sup>8</sup> It's not possible to perform such movements in the original game, because there the kid always falls over a *non-strictly traversable* construction, in case there is one.

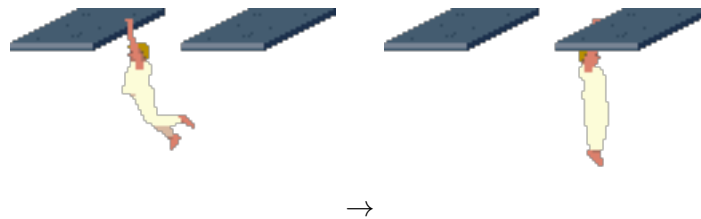


The kid can sustain himself indefinitely when *hanging non-free*, thus the only way to make him drop is by releasing *SHIFT*. As one would expect, the kid always falls aligned to the *hangable place's column*.



### 2.7.2 Hanging turn

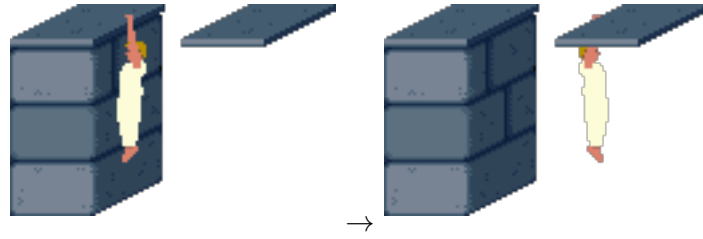
When the kid is *hanging free* in a place that is *hangable* in both directions and his feet are in the *hangable place*, pressing *BACK* while holding *SHIFT*, makes him turn in midair and hang on the con at his back.<sup>9</sup>



Naturally, if *hanging non-free* in a place that is *hangable* in both directions, there is no need to observe the kid's body inclination, just pressing *BACK*, will do the job (granted *SHIFT* is kept pressed).<sup>10</sup>

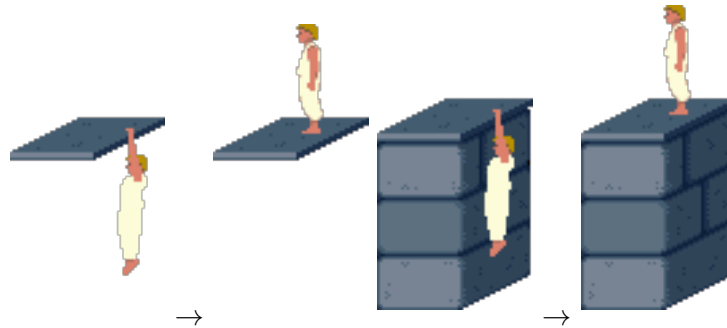
<sup>9</sup> This movement is not present in the original game.

<sup>10</sup> This movement is not present in the original game.



### 2.7.3 Climb

Pressing *UP* while hanging makes the kid climb the construction for both modes.



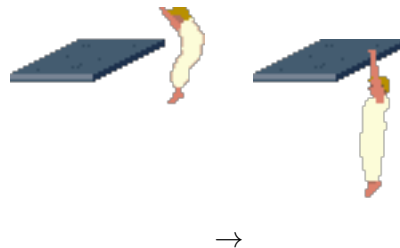
## 2.8 Fall

This mode is not really related to a key combination, but instead to a circumstance: the kid trying to support his own weight on an *strictly traversable* construction. When this happens he accelerates downwards (eventually reaching terminal velocity), until he encounters a *non-strictly traversable* construction or hangs at a *hangable place* which might appear in his way down.

If the kid hits a *non-traversable* construction with sufficient speed, he is harmed or can even die. Falling from a height of one floor inflicts no damage on him. Two floors takes one life point. Three or more kills him instantly.

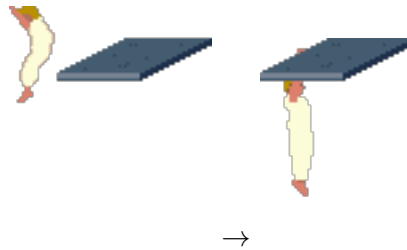
### 2.8.1 Falling hang

When falling if the kid is passing through a *hangable place* and his vertical velocity is low enough, and he's near enough to the *hangable construction*, he is able to hang there and enter *hang mode* if you hold *SHIFT* down.



### 2.8.2 Falling turn

If instead the place is *hangable* at the opposite direction, holding *SHIFT* and pressing *BACK* makes the kid turn in mid air, hang there and enter *hang mode*.<sup>11</sup>



## 2.9 Fight

If the kid has got the sword, *RETURN* takes the sword and puts him in *fight mode*.<sup>12</sup>



### 2.9.1 Fight walk forward

Pressing *FRONT*, makes the kid walk forward.



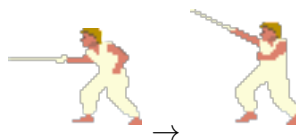
### 2.9.2 Fight walk backward

If you press *BACK*, the kid goes backward.



### 2.9.3 Defense

If you press *UP*, the kid makes the defense movement.

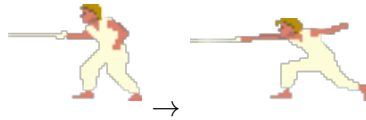


### 2.9.4 Attack

Pressing *SHIFT* makes the kid attack.

<sup>11</sup> This movement is not available in the original game.

<sup>12</sup> In the original game, the kid enters fight mode automatically in the eminence of an enemy threat.



### 2.9.5 Counter attack and counter defense

Holding *SHIFT* and *UP* puts the kid in counter attack and counter defense mode. At first, there is no immediate noticeable difference from standing still in fight mode, but as an enemy attacks<sup>13</sup>, the kid defends for certain. Then, depending upon probability whose likelihood is given by the KCA (Kid’s Counter Attack skill), he may counter attack.

If he does, depending on the enemy’s skills, they may counter defend and then counter attack. In that case, depending upon probability whose likelihood is given by the KCD (Kid’s Counter Defense skill), the kid may counter defend and the process restarts at the kid’s counter attack stage, making for a chain of counter attacks and counter defenses whose length is determined only by the fighters’ skills (and a little bit of luck). Every counter attack that is not responded with a counter defense by the opponent, makes him lose a life point.

When standing still in this mode, releasing *UP* initiates an attack (but at the same time makes the kid briefly vulnerable to the enemy’s attacks). In this case the same counter attack and counter defense chain logic described above is symmetrically applied.

Pressing *FRONT* and *BACK* (while holding *SHIFT* and *UP*) makes the kid walk forward and backward, respectively, without leaving this mode. However, although walking backward doesn’t make him lower his guard, walking forward makes him vulnerable until he puts himself on guard again.

The kid’s skills are built up by defeating enemies.<sup>14</sup> The more advanced the defeated enemy’s skills, the more the kid’s skills improve. Both skills —KCA and KCD— are given by a number between 0 and 100, interpreted as percentages, indicating the likelihood of counter attacking and counter defending, respectively.

### 2.9.6 Keep sword

Finally you can make the kid keep his sword and return to *normal mode* by pressing *DOWN*.



<sup>13</sup> In the original game the terminology for “attack” is “striking”, for “counter attack” is “re-striking after block”, for “defense” is “blocking strike” and for “counter defense” is “improper blocking”.

<sup>14</sup> In the original game there is no such skills scheme. There, if you don’t get tired of pressing *SHIFT* and *UP*, the kid’s counter attack and counter defense are infallible.



## 3 Key bindings

The engine has several key bindings that control an wide range of settings and perform useful functions. Many key bindings work anytime, in the title screen, cut scenes and levels, while others work only in the latter. The key bindings are designed to mimic those of the original game when started with the option `megahit` (improved in latter revisions), however they can implement a super-set of the functions available there and MININIM implements quite a few more. Also, many key bindings have a configuration option counterpart. See [Chapter 4 \[Configuration\]](#), page 31.

### 3.1 Game flow

- SHIFT+L* Warp to next level. Related to option `--start-level`.
- CTRL+A* Restart level.
- CTRL+R* Restart the game.
- CTRL+Q* Quit the game.

### 3.2 Graphical rendering

These key bindings modify how the engine graphically renders the game world objects.

- F9* Select hue mode. This circulates around the modes: “ORIGINAL”, “NONE”, “GREEN”, “GRAY”, “YELLOW” and “BLUE”. The “ORIGINAL” value gives level modules autonomy in this choice for each particular level. This is the default. For the classic behavior of the first version of the original game select “NONE”. Related to option `--hue-mode`.
- F10* Select guard mode. This circulates around the modes: “ORIGINAL”, “GUARD”, “FAT GUARD”, “VIZIER”, “SKELETON” and “SHADOW”. The “ORIGINAL” mode gives level modules autonomy in this choice for each particular guard. This is the default. Related to option `--guard-mode`.
- F11* Select environment mode. This circulates around the modes: “ORIGINAL”, “DUNGEON” and “PALACE”. The “ORIGINAL” value gives level modules autonomy in this choice for each particular level. This is the default. Related to option `--environment-mode`.
- F12* Select video mode. This circulates around the modes: “VGA”, “EGA”, “CGA” and “HGC”. The default is VGA. Related to option `--video-mode`.
- SHIFT+B* Toggle blind mode. In blind mode background and non-animated sprites are not drawn. The default is to draw everything. Related to option `--blind-mode`.

### 3.3 Life and death

- K* Kill enemy.<sup>1</sup>

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<sup>1</sup> This only works for the enemy currently associated with the kid. In the original game this works for the enemy in the room at view, as it can only handle one guard per room. There is no such limit in MININIM.

- R* Resurrect kid.
- I* Toggle immortal mode. In immortal mode the kid can't be harmed. The default mode is mortal. Related to option `--immortal-mode`.
- SHIFT+S* Increment kid's current life points.
- SHIFT+T* Increment kid's total life points. Related to option `--total-lives`.

### 3.4 Kid special

These key bindings give or trigger special kid's abilities.

- A* Alternate between kid and its shadows. This is intended for level modules that make use of such feature. That's not the legacy module case.
- SHIFT+W* Float kid. This is equivalent to drinking a float potion.

### 3.5 Time

These key bindings allow you to control the remaining time available to end the game. They are related to options `--time-limit` and `--start-time`.

- SPACE* Display remaining time. Notice that the remaining time is displayed automatically when it reaches multiples of 5 minutes, and it's constantly shown when remains less than a minute to its end.
- +* Increment and display remaining time. If the remaining time is greater than 1 minute, increment remaining time by 1 minute, otherwise by 1 second.
- Decrement and display remaining time. If the remaining time is greater than 1 minute, decrement remaining time by 1 minute, otherwise by 1 second.

### 3.6 Skills

These key bindings allow you to set the kid skills. They are related to options `--kca` and `--kcd`.

- TAB* Display skills. If the kid is associated with an enemy, it shows both fighters' skills, otherwise it only shows the kid's.
- CTRL+=* Increment KCA skill.
- CTRL+-* Decrement KCA skill.
- ALT+=* Increment KCD skill.
- ALT+-* Decrement KCD skill.

### 3.7 Level navigation

These key bindings allow you to move the camera around the level, making it possible to view any room linked to the current one without having to move the kid there. Notice that if the kid enters the room the camera is on, it starts following him again. There is also a couple of key bindings intended to show room coordinates, which is useful when building levels.

<i>H</i>	Move the camera to the room at left (right if the screen is flipped horizontally).
<i>J</i>	Move the camera to the room at right (left if the screen is flipped horizontally).
<i>U</i>	Move the camera to the room above (below if the screen is flipped vertically).
<i>N</i>	Move the camera to the room below (above if the screen is flipped vertically).
<i>HOME</i>	Move the camera back to the kid's room.
<i>C</i>	Show direct coordinates.
<i>SHIFT+C</i>	Show indirect coordinates.

### 3.8 Files

These key bindings are used to save and load configuration files. They open a platform-dependent file choosing dialog. Notice that save files are a particular case of configuration files and should be loaded the same way. When loaded in-game, configuration files take effect immediately, however some effects only become visible under certain conditions. For instance save files show their effect only on game (re)start.

<i>CTRL+L</i>	Load configuration. Related to option <code>--load-config</code> .
<i>CTRL+G</i>	Save game.

### 3.9 Peripherals

These key bindings allow you to tune hardware peripherals that work with the game.

<i>F</i>	Toggle fullscreen mode. In fullscreen mode the window spans the entire screen. The default is to have a window of 640x400 resolution. Related to option <code>--fullscreen</code> .
<i>SHIFT+I</i>	Select display flip mode. This circulates around the modes: “NONE”, “VERTICAL”, “HORIZONTAL” and “VERTICAL + HORIZONTAL”. The default is “NONE”. Related to option <code>--display-flip-mode</code> .
<i>SHIFT+K</i>	Select keyboard flip mode. This circulates around the modes: “NONE”, “VERTICAL”, “HORIZONTAL” and “VERTICAL + HORIZONTAL”. The default is “NONE”. Related to option <code>--gamepad-flip-mode</code> .
<i>CTRL+J</i>	Activate and auto-calibrate joystick. Use this when hot-plugging a joystick or in case the joystick starts to behave oddly. See <a href="#">Section 4.6 [Gamepad options]</a> , <a href="#">page 34</a> .
<i>CTRL+S</i>	Toggle sound. The default is to have sound enabled. Related to option <code>--sound</code> .

### 3.10 Miscellaneous

These are key bindings that don't fit in any other category.

<i>CTRL+V</i>	Show engine name and version. Related to option <code>--version</code> .
---------------	--

## 4 Configuration

MININIM can be easily setup to match user's preferences regarding the way the game looks and behaves. It features an integrated configuration system which offers three distinct interfaces: *command line options*, *environment variables* and *configuration files*.

The configuration system uses the command line options parser as the central interpreter for the configuration process. Providing a single options parsing routine allows for easy maintenance, equivalence between methods and a canonical interface for integrating future methods.

For that end, each configuration option backend implements a translator between its specifics of option representation and access, to a normal command line array. Then the resulting options are roughly processed as if they were given at the engine invocation command line.

As the options are the same for all three current methods of configuration, and all of them are in essence processed as command line options, it's unnecessary to describe all options for each separately. Therefore, we provide systematic rules for converting between method option names and their command line equivalents, and then describe only the latter.

The rule for option naming conversion is very simple: for every command line option of the form `x-y` there is an equivalent environment variable option `MININIM_X_Y` and an equivalent configuration file option `'x y'`.

The multiple methods of configuration are cumulative but command line options override any other, while environment variables override the main configuration file. In any method applicable later options override earlier ones. The option `--print-paths` shows, among other things, the expected file name of the main configuration file. Configuration files have INI format without any sections, like this:

```
option 0 = value 0
...
option n = value n
```

Notice that many options can be changed on the fly by key binding counterparts. See [Chapter 3 \[Key bindings\], page 28](#).

The following remarks apply to the options list in this chapter:

- Long option names are case sensitive.
- Option values are case insensitive.
- Both can be partially specified as long as they are kept unambiguous.
- *boolean* is an integer equating to '0', or any sub-string (including the null string) of 'FALSE', 'OFF' or 'NO' to disable the respective feature, and any other value (even no string at all) to enable it.
- For any non-specified option the documented default applies.
- Integers can be specified in any of the formats defined by the C language.
- Key bindings references are based on the default mapping.

The legacy command line interface present in versions 1.0, 1.3 and 1.4 of the original game is supported for the sake of compatibility with software that use it. Legacy level and video non-option arguments are honored, while all others are currently ignored silently. The

legacy arguments can't be used by other configuration method besides the command line. The legacy command line arguments are:

- **Cheat:** megahit, improved;
- **Audio:** adlib, compuadd, covox, digi, disney, gblast, ibmg, midi, mvpas, sblast, stdsnd, tandy;
- **Video:** cga, draw, ega, herc, hga, mcga, tga, vga;
- **Memory:** bypass, pack, unpack, demo, j;

These are case insensitive. Additionally specifying a standalone integer *i* is equivalent to passing the option `--start-level=i`. Unlike the original game, there is no dependence between any two arguments (like start level and cheat arguments).

## 4.1 Configuration options

### `--ignore-environment`

Ignore environment variables. The default is to parse them after the main configuration file.

### `--ignore-main-config`

Ignore main configuration file. The default is to parse it at the very beginning of each run.

### `--load-config=FILE`

Load configuration file *file*. The options set in *file* have the same precedence as the equivalent command line options given at its place of occurrence. This can be done in-game by the `CTRL+L` key binding.

## 4.2 Level options

### `--level-module=LEVEL-MODULE`

Select level module. A level module determines a way to generate consecutive levels for use by the engine. Valid values for *level-module* are: 'LEGACY', 'PLV', 'DAT' and 'CONSISTENCY'. 'LEGACY' is the module designed to read the original PoP (Prince of Persia) 1 raw level files. 'PLV' is the module designed to read the original PoP 1 PLV extended level files. 'DAT' is the module designed to read the original PoP 1 LEVELS.DAT file. 'CONSISTENCY' is the module designed to generate random-corrected levels for accessing the engine robustness. The default is 'LEGACY'.

### `--start-level=N`

Make the kid start at level *n*. The default is '1'. Valid integers range from '1' to INT\_MAX. This can be changed in-game by the `SHIFT+L` key binding.

### `--start-pos=R,F,P`

Make the kid start at room *r*, floor *f* and place *p*. The default is to let this decision to the level module. *r* is an integer ranging from 1 to INT\_MAX, *f* is an integer ranging from 0 to 2 and *p* is an integer ranging from 0 to 9. See [Chapter 1 \[Constructions\], page 2](#).

If the option `--level-module` is not given and there is a `LEVELS.DAT` file in the resources directory, the `DAT` level module is automatically used to load that file. This is a compatibility measure for applications which depend upon this legacy behavior.

### 4.3 Time options

`--start-time=N`

Set the play time counter to  $n$  seconds. The default is '0'. Valid integers range from '0' to `INT_MAX`.

`--time-limit=N`

Set the time limit to complete the game to  $n$  seconds. The default is '3600' (1 hour). Valid integers range from '1' to `INT_MAX`. This can be changed in-game by the `+` and `-` key bindings.

### 4.4 Skills options

`--immortal-mode[=BOOLEAN]`

Enable/disable immortal mode. In immortal mode the kid can't be harmed. The default is 'FALSE'. This can be changed in-game by the `I` key binding.

`--kca=N` Set kid's counter attack skill to  $n$ . The default is '0'. Valid integers range from '0' to '100'. This can be changed in-game by the `CTRL+=` and `CTRL+-` key bindings.

`--kcd=N` Set kid's counter defense skill to  $n$ . The default is '0'. Valid integers range from '0' to '100'. This can be changed in-game by the `ALT+=` and `ALT+-` key bindings.

`--total-lives=N`

Make the kid start with  $n$  total lives. The default is '3'. Valid integers range from '1' to '10'. This can be changed in-game by the `SHIFT+T` key binding.

### 4.5 Rendering options

`--blind-mode[=BOOLEAN]`

Enable/disable blind mode. In blind mode background and non-animated sprites are not drawn. The default is 'FALSE'. This can be changed in-game by the `SHIFT+B` key binding.

`--display-flip-mode=DISPLAY-FLIP-MODE`

Select display flip mode. Valid values for *display-flip-mode* are: 'NONE', 'VERTICAL', 'HORIZONTAL' and 'VERTICAL-HORIZONTAL'. The default is 'NONE'. This can be changed in-game by the `SHIFT+I` key binding.

`--environment-mode=ENVIRONMENT-MODE`

Select environment mode. Valid values for *environment-mode* are: 'ORIGINAL', 'DUNGEON' and 'PALACE'. The 'ORIGINAL' value gives level modules autonomy in this choice for each particular level. This is the default. This can be changed in-game by the `F11` key binding.

**--guard-mode=GUARD-MODE**

Select guard mode. Valid values for *guard-mode* are: ‘ORIGINAL’, ‘GUARD’, ‘FAT-GUARD’, ‘VIZIER’, ‘SKELETON’ and ‘SHADOW’. The ‘ORIGINAL’ value gives level modules autonomy in this choice for each particular guard. This is the default. This can be changed in-game by the *F10* key binding.

**--hue-mode=HUE-MODE**

Select hue mode. Valid values for *hue-mode* are: ‘ORIGINAL’, ‘NONE’, ‘GREEN’, ‘GRAY’, ‘YELLOW’ and ‘BLUE’. The ‘ORIGINAL’ value gives level modules autonomy in this choice for each particular level. This is the default. For the classic behavior of the first version of the original game use ‘NONE’. This can be changed in-game by the *F9* key binding.

**--mirror-mode [=BOOLEAN]**

Enable/disable mirror mode. In mirror mode the screen and the keyboard are flipped horizontally. This is equivalent of specifying both the options **--display-flip-mode=HORIZONTAL** and **--gamepad-flip-mode=HORIZONTAL**. The default is ‘FALSE’. This can be changed in-game by the *SHIFT+I* and *SHIFT+K* key bindings for the display and keyboard, respectively.

**--video-mode=VIDEO-MODE**

Select video mode. Valid values for *video-mode* are: ‘VGA’, ‘EGA’, ‘CGA’ and ‘HGC’. The default is ‘VGA’. This can be changed in-game by the *F12* key binding.

## 4.6 Gamepad options

Gamepad is an umbrella term used in MININIM to describe any hardware device that enables the user to control the kid’s movements. Currently, there is support for two classes of gamepads: *keyboard* and *joystick*.

The primary joystick’s axis and button numbers are listed by the option **--joystick-info**. You can find out the number of a particular axis or button by pressing it before invoking MININIM with that option. If a stick, axis or button given to an option doesn’t exist in the primary joystick, it’s silently ignored. The joystick can be activated and auto-calibrated in-game by the *CTRL+J* key binding. See [Section 3.9 \[Peripherals\], page 30](#). If your joystick is peculiar enough, proving the auto-calibration mechanism insufficient, the **--joystick-axis-threshold** and **--joystick-button-threshold** options may help.

**--gamepad-flip-mode=GAMEPAD-FLIP-MODE**

Select gamepad flip mode. Valid values for *gamepad-flip-mode* are: ‘NONE’, ‘VERTICAL’, ‘HORIZONTAL’ and ‘VERTICAL-HORIZONTAL’. The default is ‘NONE’. This can be changed in-game by the *SHIFT+K* key binding.

**--joystick-axis=FUNC,STICK,AXIS**

Map function *func* to joystick axis *stick,axis*. Valid values for *func* are: ‘H’ and ‘V’. *stick,axis* is a valid stick and axis pair. The default *stick,axis* for ‘H’ is ‘0,0’ and for ‘V’ is ‘0,1’.

- `--joystick-axis-threshold=FUNC,VALUE`  
Set joystick threshold to *value* for the axis mapped to *func*. Valid values for *func* are 'H' and 'V'. *value* is a floating point ranging from 0.0 to 1.0. The default *value* for 'H' is 0.1 and for 'V' is 0.8.
- `--joystick-button=FUNC,BUTTON`  
Map function *func* to joystick button *button*. Valid values for *func* are: 'UP', 'RIGHT', 'DOWN', 'LEFT', 'ENTER', 'SHIFT', 'TIME', 'PAUSE'. *button* is a valid joystick button number. The default *button* values are 0, 1, 2, 3, 4, 5, 8 and 9, respectively.
- `--joystick-button-threshold=FUNC,VALUE`  
Set joystick threshold to *value* for the button mapped to *func*. Valid values for *func* are: 'UP', 'RIGHT', 'DOWN', 'LEFT', 'ENTER', 'SHIFT'. *value* is an integer ranging from 0 to 32767. The default *value* for any function is 100.
- `--joystick-info`  
Print information about the primary joystick and exit.

## 4.7 Window options

- `--fullscreen[=BOOLEAN]`  
Enable/disable fullscreen mode. In fullscreen mode the window spans the entire screen. The default is 'FALSE'. This can be changed in-game by the *F* key binding.
- `--window-dimensions=WxH`  
Set window width and height to *w* and *h*, respectively. The default is '640x400'. The values *w* and *h* are strictly positive integers and must be separated by an 'x'.
- `--window-position=X,Y`  
Place the window at screen coordinates *x,y*. The default is to let this choice to the window manager. The values *x* and *y* are integers and must be separated by a comma.

## 4.8 Paths options

- `--data-path=PATH`  
Set data path to *path*. Normally, the data files are looked for in the current working directory, then in the user data directory, then in the resources directory, and finally in the system data directory. If this option is given, before looking there the data files are looked for in *path*.
- `--print-paths`  
Print paths and exit.

## 4.9 Other options

- `--inhibit-screensaver[=BOOLEAN]`  
Prevent the system screensaver from starting up. The default is 'TRUE'.



`--skip-title[=BOOLEAN]`

Skip title screen. The default is 'FALSE'.

`--sound[=BOOLEAN]`

Enable/disable sound. The default is 'TRUE'. This can be changed in-game by the *CTRL+S* key binding.

## 4.10 Help options

`-?`

`--help` Print options list and exit

`--usage` Print a short usage message and exit

`-V`

`--version`

Print program name and version and exit

## 5 Software package

This chapter briefly discuss matters relevant to MININIM while a software package: build, installation, distribution and contribution are some of the covered topics. Bear in mind that instructions in this chapter are package-specific; for general and in-depth configuration, build and installation instructions refer to the `INSTALL` file present in the top-level directory of the source distribution. If you have checked out the source tree from the VCS repository see [Section 5.8 \[Hacking\], page 39](#).

For more information about this program you can visit its home page at <http://oitofelix.github.io/mininim/>. If you want to receive notifications about new releases of this program subscribe to the author's atom feed at <http://oitofelix.github.io/feed.xml>.

### 5.1 Description

*Menininho* is the Brazilian Portuguese word for *male kid*, and *mininim* is how it's informally pronounced throughout the country. *Kid* is the term used by *Jordan Mechner*<sup>1</sup> when referring to the main character of his most famous game — **Prince of Persia** — in its source code and documentation, because the character's movements were derived from rotoscoping footage of Mechner's little brother. **MININIM** is the *Advanced Prince of Persia Engine*, written from scratch by computer programmer and free software activist *Bruno Félix Rezende Ribeiro* (`oitofelix`). Bruno had a childhood dream of deciphering the secrets of his favorite game that introduced him to computing — a dream dreamt when he was just a kid, a dream realized now that he's still a *mininim* deep in his heart.<sup>2</sup>

MININIM is the Advanced Prince of Persia Engine — a childhood dream, the free software implementation of Jordan Mechner's masterpiece game, developed from scratch by Bruno Félix Rezende Ribeiro (`oitofelix`). *MININIM is free software*; you can redistribute it and/or modify it under the terms of the GNU **GPL** (General Public Licence) as published by the FSF (Free Software Foundation); either version 3, or (at your option) any later version.

In addition to being already a complete replacement for the original game with several improvements, MININIM aims to have detailed documentation on all matters concerning the original Prince of Persia world, ranging from its design concepts to the engine's practical use and development. *MININIM documentation is free*; you can redistribute it and/or modify it under the terms of the GNU **FDL** (Free Documentation Licence) as published by the FSF — with no Invariant Sections; either version 1.3, or (at your option) any later version.

MININIM features various of improvements over the original game, too many to make an exhaustive list here. Some of its noteworthy advantages are:

- Portable to modern operating systems.

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<sup>1</sup> Jordan Mechner (born June 4, 1964) is an American video game designer, author, screenwriter, and filmmaker, best known for creating the Prince of Persia video game franchise and the 8-bit computer game *Karateka*.

<sup>2</sup> Of course, none of this is reason enough to name a game engine “MININIM”, if not by the fact that it's a really cool palindrome!

- Video, environment, hue and guard modes may be selected on-the-fly.
- Mirror mode (inverts screen and gamepad axis horizontally).
- Joystick mapping and threshold configuration.
- Improved battle system based on upgradable skills, arbitrary number of simultaneous fighters and smarter enemy AI.
- Real-time responsiveness, higher world interaction accuracy and more stable animations.
- New useful movements.
- Volume of sounds based on distance from the source.
- Integrated configuration system using multiple back-ends.
- Capability of loading level files in multiple formats.

## 5.2 Distribution

This program is *free software*; this means that everyone is free to use it and free to redistribute it under certain conditions. This program is not in the public domain; it is copyrighted and there are restrictions on its distribution, but these restrictions are designed to permit everything that a good cooperating citizen would want to do. What is not allowed is to try to prevent others from further sharing any version of this program that they might get from you. The precise conditions are found in the GNU [GPL](#) (General Public Licence). The program manual is covered by the GNU Free Documentation License ([Appendix C \[GNU FDL\], page 47](#)). This license is similar in spirit to the GNU General Public License, but is more suitable for documentation.

## 5.3 Getting a copy

One way to get a copy of this program is from someone else who has it. You need not ask for our permission to do so, or tell any one else; just copy it. If you have access to the Internet, you can get the latest distribution version of this program at <http://oitofelix.github.io/mininim/>.

A VCS repository, where the development takes place, is also available. It maintains the full history of modifications for every single source file. You can checkout any given revision of any file or get an snapshot of the entire source tree in a particular desired state. Special build tools, as described in [Section 5.8 \[Hacking\], page 39](#), are required to build from those checkouts. To stay up to date with the latest developments in the source tree, you can anonymously checkout the repository with the following command:

```
git clone https://github.com/oitofelix/mininim.git
```

## 5.4 Contact

You can get in touch with other users of this program by posting to the forum at <http://forum.prined.org/viewtopic.php?f=69&t=3783>. You can contact the author at [oitofelix@gnu.org](mailto:oitofelix@gnu.org). You may also join us on our friendly IRC channel at <irc://irc.freenode.net/mininim>.

## 5.5 Bug reporting

You can report bugs at <https://github.com/oitofelix/mininim/issues>. Please, when reporting a bug include enough information for the author to reproduce the problem. Generally speaking, that means:

- The contents of any input files necessary to reproduce the bug and command line invocations of the program(s) involved (crucial!).
- A description of the problem and any samples of the erroneous output.
- The version number of the program(s) involved (use `--version`).
- Hardware, operating system, and compiler versions (`uname -a`).
- Unusual options you gave to configure, if any (see `config.status`).
- Anything else that you think would be helpful.

## 5.6 Contributing

This program is a collaborative effort and we encourage contributions from anyone and everyone — your help is very much appreciated. You can help in many ways:

- Donate to the author in order to support his work. See [Section 5.7 \[Donating\]](#), page 39.
- Help users in the forum and IRC channel. See [Section 5.4 \[Contact\]](#), page 38.
- Find and report bugs. See [Section 5.5 \[Bug reporting\]](#), page 39.
- Suggest new features.
- Submit portability patches.

## 5.7 Donating

MININIM development is voluntary. If you like this game and want to thank the author for the work he has done so far, or want to enable him to spend more time improving it, please make a donation! For values equal or greater than 50 US\$ or 0.12 BTC your name will be acknowledged in this manual ([Appendix B \[Donors\]](#), page 46) and in the donors page at the author's website (<http://oitofelix.github.io/funding.html#donors>). If you decide to make recurrent donations, the total amount of your donations will be updated every month for all records. Please, donate at <http://oitofelix.github.io/funding.html>.

**Thank you for your support!**

## 5.8 Hacking

The development sources are available through VCS:

```
https://github.com/oitofelix/mininim
```

If you are getting the sources from the VCS (or change `configure.ac`), you'll need to have Automake, Autoconf and help2man installed to (re)build.

Building from sources should be quite straightforward, provided you install the Allegro 5 development libraries using your distribution's package manager. If you use an apt based distribution (Debian, Ubuntu, ...) you can do this by invoking the command:

```
sudo apt-get install '^liballegro.*5-dev$'
```

When building the sources, the usual incantation `./bootstrap && ./configure && make` is often enough. The installation step (`make install`) is optional as MININIM is able to run directly from its source directory (provided you don't make a VPATH build, in which case you need to specify the *data path*. See the `--data-path` option). After that first time, running `make` should suffice to rebuild the program with your changes. See file `INSTALL`.

When committing changes to the repository always create an entry in the `doc/release/latest-news.texi` file for any user-visible changes or additions made. This file is intended to provide the latest release news for the `NEWS.texi` and `ANNOUNCEMENT.texi` files to avoid duplication of information and syncing work. After a release is made the news items should be moved to the `NEWS.texi` file and another news list should be built from scratch in the `latest-news.texi` file.

## 5.9 MinGW

These are the steps to build using MinGW, in a machine running Microsoft Windows.

- Download and install git: <https://git-scm.com/download/win>.
- Clone the gnulib repository: `git clone git://git.savannah.gnu.org/gnulib.git` and add the gnulib root to your `PATH`.
- Download MinGW: <http://downloads.sourceforge.net/project/mingw/Installer/mingw-get-setup.exe>
- Install the packages: `'mingw32-base', 'mingw32-gcc-g++', 'msys-base', 'mingw32-autoconf', 'mingw32-automake'`.
- Rename the file `C:/MinGW/msys/1.0/etc/fstab.sample` to `fstab`.
- Download Allegro: <http://cdn.allegro.cc/file/library/allegro/5.0.10/allegro-5.0.10-mingw-4.7.0.zip> and extract its root folder's contents to `C:\MinGW`.
- Run `msys`: `C:\MinGW\msys\1.0\msys.bat`
- Clone the repository: `git clone https://github.com/oitofelix/mininim.git`
- Build: `cd mininim && ./bootstrap && ./configure && make`
- Distribute the resulting binary `mininim.exe` along with the following dlls: `C:\MinGW\bin\libstdc++-6.dll` and `C:\MinGW\bin\libgcc_s_dw2-1.dll`.

## Appendix A Announcement

*Menininho* is the Brazilian Portuguese word for *male kid*, and *mininim* is how it's informally pronounced throughout the country. *Kid* is the term used by *Jordan Mechner*<sup>1</sup> when referring to the main character of his most famous game — **Prince of Persia** — in its source code and documentation, because the character's movements were derived from rotoscoping footage of Mechner's little brother. **MININIM** is the *Advanced Prince of Persia Engine*, written from scratch by computer programmer and free software activist *Bruno Félix Rezende Ribeiro* (**oitofelix**). Bruno had a childhood dream of deciphering the secrets of his favorite game that introduced him to computing — a dream dreamt when he was just a kid, a dream realized now that he's still a *mininim* deep in his heart.<sup>2</sup>

MININIM is the Advanced Prince of Persia Engine — a childhood dream, the free software implementation of Jordan Mechner's masterpiece game, developed from scratch by Bruno Félix Rezende Ribeiro (**oitofelix**). *MININIM is free software*; you can redistribute it and/or modify it under the terms of the GNU **GPL** (General Public Licence) as published by the FSF (Free Software Foundation); either version 3, or (at your option) any later version.

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MININIM features various of improvements over the original game, too many to make an exhaustive list here. Some of its noteworthy advantages are:

- Portable to modern operating systems.
- Video, environment, hue and guard modes may be selected on-the-fly.
- Mirror mode (inverts screen and gamepad axis horizontally).
- Joystick mapping and threshold configuration.
- Improved battle system based on upgradable skills, arbitrary number of simultaneous fighters and smarter enemy AI.
- Real-time responsiveness, higher world interaction accuracy and more stable animations.
- New useful movements.
- Volume of sounds based on distance from the source.
- Integrated configuration system using multiple back-ends.
- Capability of loading level files in multiple formats.

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<sup>1</sup> Jordan Mechner (born June 4, 1964) is an American video game designer, author, screenwriter, and filmmaker, best known for creating the Prince of Persia video game franchise and the 8-bit computer game Karateka.

<sup>2</sup> Of course, none of this is reason enough to name a game engine “MININIM”, if not by the fact that it's a really cool palindrome!

## News

### Features:

- Joystick support. To use a joystick just plug it in and press `CTRL+J` to enable and auto-calibrate it on the fly. See the manual for the default mapping. If the default mapping doesn't suit you or your joystick, you can use the options `--joystick-axis`, `-joystick-button` and `--joystick-info` to define a new mapping. In case your joystick is ill-behaved the `--joystick-axis-threshold` and `--joystick-button-threshold` options may help. Using a joystick doesn't disable the keyboard — you can use both interchangeably.
- Classic numeric keypad control. This is always enabled, and can be used along the two other input methods (arrow keys and joystick). The original game manual used to refer to this as the standard input method.
- Apoplexy level editor integration. Just copy MININIM's executable along with any dlls (if under *Windows*) and its `data` directory to apoplexy's `prince/` directory, rename the executable to `prince.exe` (`prince` if under *GNU/Linux*) and make sure there is a `LEVELS.DAT` file there, and you are ready to go. Apoplexy will invoke MININIM as a drop-in replacement for the original engine.
- Hue coloring support. This makes the engine able to render VGA color schemes like the 1.3 and 1.4 versions of the original game. That's the default. You can force particular hue modes by using the `--hue-mode` option or the `F9` key binding. To revert to the previous and classic behavior use `--hue-mode=NONE`.
- Support for reading legacy PoP 1 `LEVELS.DAT` file using the option `--legacy-level=DAT`. Put the `LEVELS.DAT` file inside `data/dat-levels/` directory and use that option.
- Support for reading legacy PoP 1 PLV extended level files using the option `--legacy-level=PLV`. Put the `00.plv..15.plv` PLV files inside `data/plv-levels/` and use that option.
- Command line legacy compatibility for the sake of applications which use it. Used by apoplexy.
- `LEVELS.DAT` legacy loading behavior compatibility for the sake of applications that rely on it. Used by apoplexy. Just put the `LEVELS.DAT` file in the same directory as the `minim` executable and preference will be given to it, over the legacy level files under the `dat/legacy-levels/` directory.
- Kid start position can be specified using the `--start-pos` option. Very useful for placing the kid in a specific place for tests. To start with the kid in level 12, room 15, floor 0 and place 7, invoke MININIM with the options `--start-level=12 --start-pos=15,0,7`.
- Disable screensaver by default.
- Guards have infallible defense in refraction periods, for longer and more dramatic battles.
- Shadow in legacy level 12 has the same total/current life points as the kid, and life points are taken off one at a time, for a longer and more dramatic battle.
- `--keyboard-flip-mode` option renamed to `--gamepad-flip-mode`, since now it applies to joysticks as well.

**Bug fixes:**

All the bugs the author knew about at the time of this release have been fixed. If you've found a bug or annoyance in the previous version, chances are it has been fixed, as well. ;-)

- Spurious wall collision occurs in kid's stabilization movement.
- Kid can't hang on a ledge after a long floating fall.
- Kid's *run* movement after a *running turn* starts one frame off.
- In some circumstances the kid is unable to reach the other end after a jump, as if a force field prevented him from landing there.
- Kid dies after just touching guards.
- Guards spuriously attack thin air while trying to prevent the kid from bypassing them.
- While in counter attack and counter defense mode kid defends even if too far from the guard, when he could otherwise let the guard strike only thin air.
- Restarting the game while it's paused causes it to get stuck in a paused state after the title screen.
- It's hard to perform 3-tile running jumps because MININIM is lacking platform edge detection.
- Kid doesn't stumble on guards, in case he manages to pass through them without being hit.
- Guards continue to advance towards the kid, even when he is running towards them.
- Guard mode changing doesn't work for guards that died falling, spiked or chopped.
- Kid can't battle properly against more than one guard at once.
- Shadow death music in level 12 plays in a row if reviving kid with R repeatedly in a short period of time.
- Legacy level rooms above room 0 may have traversable constructions at bottom over room 0's walls.
- In legacy level 12 shadow appears sooner than expected if the kid manages to enter room 15 from below after exiting room 18 to the right.
- Guards turn too quickly when their attention is grabbed from opposite directions in a short period of time.
- Drawing glitches occur in several situations involving two characters near each other.
- Fight mode collision detection is ill-behaved for kid and guards.
- Game doesn't pause while saving.
- In some cases of death after fight, the normal death tune is played along the fight one.
- Falling close to door makes kid collide and stabilize standing, instead of crouching.
- Guard chasing logic has flaws and corner cases that result in counter-intuitive guard behavior in certain situations.
- If the kid is exactly 27 pixels from falling, walking to the very edge and then from there again doesn't trigger a misstep.
- Turning close to door at its left causes a spurious collision.
- Game saves should store the remaining time of when kid first enters the level, not of when the game is saved.
- Simple jump might fall earlier than expected.



## Links

Homepage <http://oitofelix.github.io/mininim/>

Atom feed <http://oitofelix.github.io/feed.xml>

Forum <http://forum.prined.org/viewtopic.php?f=69&t=3783>

IRC channel

<irc://irc.freenode.net/mininim>

Bug reporting

<https://github.com/oitofelix/mininim/issues>

VCS

<https://github.com/oitofelix/mininim>

## Download

### User's Manual

If you just want to have a look in the latest release documentation, you can download the manual in PDF format separately.

<https://github.com/oitofelix/mininim/releases/download/v0.10/mininim-0.10.pdf>

### Windows

If you are under Microsoft Windows a MinGW build is readily available. No installation is required, just extract the zip archive and run `mininim.exe`. The PDF manual is bundled as well.

<https://github.com/oitofelix/mininim/releases/download/v0.10/mininim-0.10-win32.zip>

### GNU/Linux

If you use GNU/Linux, you have to build from source. This should be quite straightforward, provided you install the Allegro 5 development libraries using your distribution's package manager. If you use an apt based distribution (Debian, Ubuntu, ...) you can do this by invoking the command:

```
sudo apt-get install '^liballegro.*5-dev$'
```

When building the sources, the usual incantation `./configure && make` is often enough. The installation step (`make install`) is optional as MININIM is able to run directly from its source directory (provided you don't make a `VPATH` build, in which case you need to specify the *data path*. See the `--data-path` option).

Here are the compressed sources and a GPG detached signature:

- <https://github.com/oitofelix/mininim/releases/download/v0.10/mininim-0.10.tar.gz>
- <https://github.com/oitofelix/mininim/releases/download/v0.10/mininim-0.10.tar.gz.sig>

Use the `.sig` file to verify that the corresponding file (without the `.sig` suffix) is intact. First, be sure to download both the `.sig` file and the corresponding tarball. Then, run this command:

```
gpg --verify mininim-0.10.tar.gz.sig
```

If that command fails because you don't have the required public key, then run this command to import it:

```
gpg --recv-keys 0x28D618AF --keyserver hkp://keys.gnupg.net
```

and rerun the `gpg --verify` command.

This release is signed by *Bruno Félix Rezende Ribeiro*. His key fingerprint is 7CB1 208C 7336 56B7 5962 2500 27B9 C6FD 28D6 18AF.

This release was bootstrapped with the following tools:

- GNU Autoconf 2.69
- GNU Automake 1.14.1
- GNU Texinfo 5.2

## To do

The following additional features are planned to be implemented eventually.

- Native level format
- Level editor
- Level generator module
- Guile scripting
- Network play

## Please, support MININIM development!

MININIM development is voluntary. If you like this game and want to thank the author for the work he has done so far, or want to enable him to spend more time improving it, please make a donation! For values equal or greater than 50 US\$ or 0.12 BTC your name will be acknowledged in this manual ([Appendix B \[Donors\], page 46](#)) and in the donors page at the author's website (<http://oitofelix.github.io/funding.html#donors>). If you decide to make recurrent donations, the total amount of your donations will be updated every month for all records. Please, donate at <http://oitofelix.github.io/funding.html>.

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## Appendix D Linux and the GNU system

The original version of this essay was published as the file `etc/LINUX-GNU` in the GNU Emacs distribution.

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The GNU project started in 1984 with the goal of developing a complete free Unix-like operating system: GNU. “Free” refers to freedom, not price; it means you are free to run, copy, distribute, study, change, and improve the software.

A Unix-like system consists of many different programs. We found some components already available as free software—for example, X Windows and  $\text{\TeX}$ . We obtained other components by helping to convince their developers to make them free—for example, the Berkeley network utilities. This left many missing components that we had to write in order to produce GNU—for example, GNU Emacs, the GNU C compiler, the GNU C library, Bash, and Ghostscript. The GNU system consists of all these components together.

The GNU project is not just about developing and distributing some useful free software. The heart of the GNU project is an idea: that software should be free, that software users should have freedom to participate in a community. To run your computer, you need an operating system; if it is not free, your freedom has been denied. To have freedom, you need a free operating system. We therefore set out to write one.

In the long run, though, we cannot expect to keep the free operating system free unless the users are aware of the freedom it gives them, and value that freedom. People who do not appreciate their freedom will not keep it long. If we want to make freedom last, we need to spread awareness of the freedoms they have in free software.

The GNU project's method is that free software and the idea of users' freedom support each other. We develop GNU software, and as people encounter GNU programs or the GNU system and start to use them, they also think about the GNU idea. The software shows that the idea can work in practice. Some of these people come to agree with the idea, and then they are more likely to write additional free software. Thus, the software embodies the idea, spreads the idea, and grows from the idea.

Early on in the development of GNU, various parts of it became popular even though users needed proprietary systems to run them on. Porting the system to many systems and maintaining them required a lot of work. After that work, most GNU software is easily configured for a variety of different platforms.

By 1991, we had found or written all of the essential major components of the system except the kernel, which we were writing.<sup>1</sup>

That was the situation when Linux came into being. Linux is a kernel, like the kernel of Unix; it was written by Linus Torvalds, who released it under the GNU General Public

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<sup>1</sup> This kernel consists of the Mach microkernel plus the GNU HURD. The first test release was made in 1996. Now, in 2002, it is running well, and Hurd-based GNU systems are starting to be used.

License. He did not write this kernel for GNU, but it fit into the gap in GNU. The combination of GNU and Linux included all the major essential components of a Unix-compatible operating system. Other people, with some work made the combination into a usable system. The principal use of Linux, the kernel, is as part of this combination.

The popularity of the GNU/Linux combination is success, in the sense of popularity, for GNU. Ironically, the popularity of GNU/Linux undermines our method of communicating the ideas of GNU to people who use GNU.

When GNU programs were only usable individually on top of another operating system, installing and using them meant knowing and appreciating these programs, and thus being aware of GNU, which led people to think about the philosophical base of GNU. Now users can install a unified operating system which is basically GNU, but they usually think these are “Linux systems”. At first impression, a “Linux system” sounds like something completely distinct from the “GNU system,” and that is what most users think.

This leads many users to identify themselves as a separate community of “Linux users”, distinct from the GNU user community. They use more than just some GNU programs, they use almost all of the GNU system, but they don’t think of themselves as GNU users. Often they never hear about the GNU idea; if they do, they may not think it relates to them.

Most introductions to the “Linux system” acknowledge that GNU software components play a role in it, but they don’t say that the system as a whole is a modified version of the GNU system that the GNU project has been developing and compiling since Linus Torvalds was in junior high school. They don’t say that the main reason this free operating exists is that the GNU Project worked persistently to achieve its goal of freedom.

As a result, most users don’t know these things. They believe that the “Linux system” was developed by Linus Torvalds “just for fun”, and that their freedom is a matter of good fortune rather than the dedicated pursuit of freedom. This creates a danger that they will leave the survival of free software to fortune as well.

Since human beings tend to correct their first impressions less than called for by additional information they learn later, these users will tend to continue to underestimate their connection to GNU even if they do learn the facts.

When we began trying to support the GNU/Linux system, we found this widespread misinformation led to a practical problem—it hampered cooperation on software maintenance. Normally when users change a GNU program to make it work better on a particular system, they send the change to the maintainer of that program; then they work with the maintainer, explaining the change, arguing for it, and sometimes rewriting it for the sake of the overall coherence and maintainability of the package, to get the patch installed. But people who thought of themselves as “Linux users” showed a tendency to release a forked “Linux-only” version of the GNU program and consider the job done. In some cases we had to redo their work in order to make GNU programs run as released in GNU/Linux systems.

How should the GNU project encourage its users to cooperate? How should we spread the idea that freedom for computer users is important?

We must continue to talk about the freedom to share and change software—and to teach other users to value these freedoms. If we value having a free operating system, it makes sense to think about preserving those freedoms for the long term. If we value having a

variety of free software, it makes sense to think about encouraging others to write free software, instead of proprietary software.

However, it is not enough just to talk about freedom; we must also make sure people know the reasons it is worth listening to what we say.

Long explanations such as our philosophical articles are one way of informing the public, but you may not want to spend so much time on the matter. The most effective way you can help with a small amount of work is simply by using the terms “Linux-based GNU system” or “GNU/Linux system”, instead of “Linux system,” when you write about or mention such a system. Seeing these terms will show many people the reason to pay attention to our philosophical articles.

The system as a whole is more GNU than Linux; the name “GNU/Linux” is fair. When you are choosing the name of a distribution or a user group, a name with “GNU/Linux” will reflect both roots of the combined system, and will bring users into connection with both—including the spirit of freedom and community that is the basis and purpose of GNU.

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