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Input Combos

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1. INTRODUCTION

1.1. Presentation blocks

Block I: Theory

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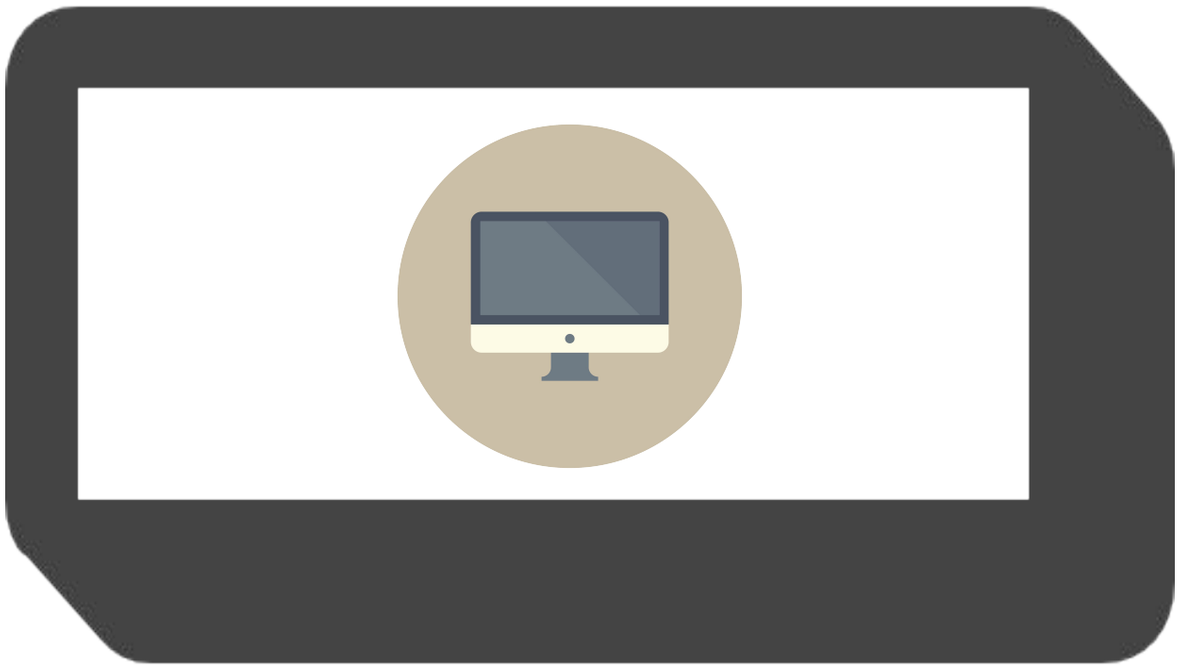
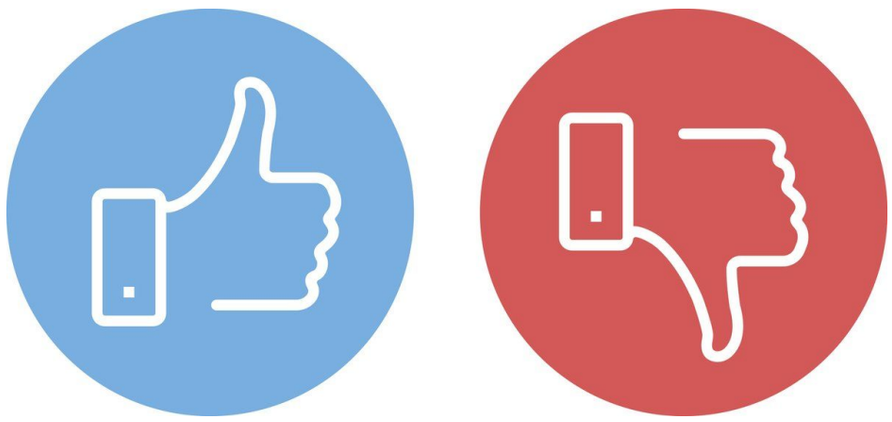


1.2. What is a combo?

Definition by wikipedia:

Combo: set of actions performed in sequence, usually with strict timing limitations, that yield a significant benefit or advantage.



Do you agree or disagree?

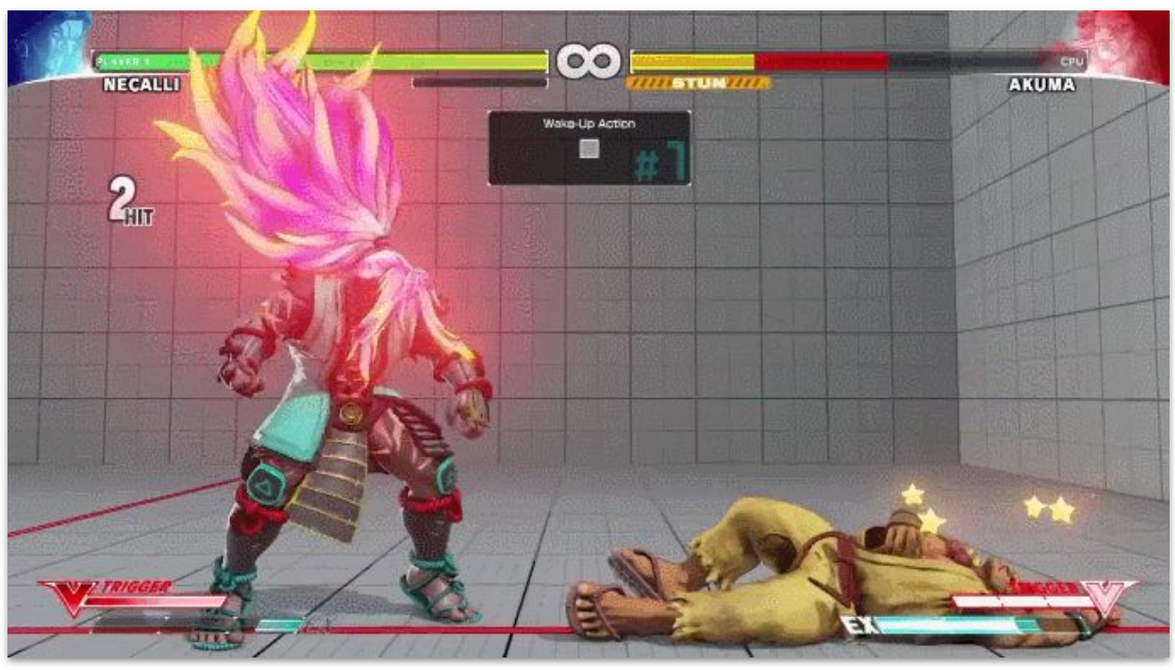
2. BLOCK I: DEEPING INTO THE SUBJECT

2.1. Combo differentiation

Notice the difference?

1)

2)

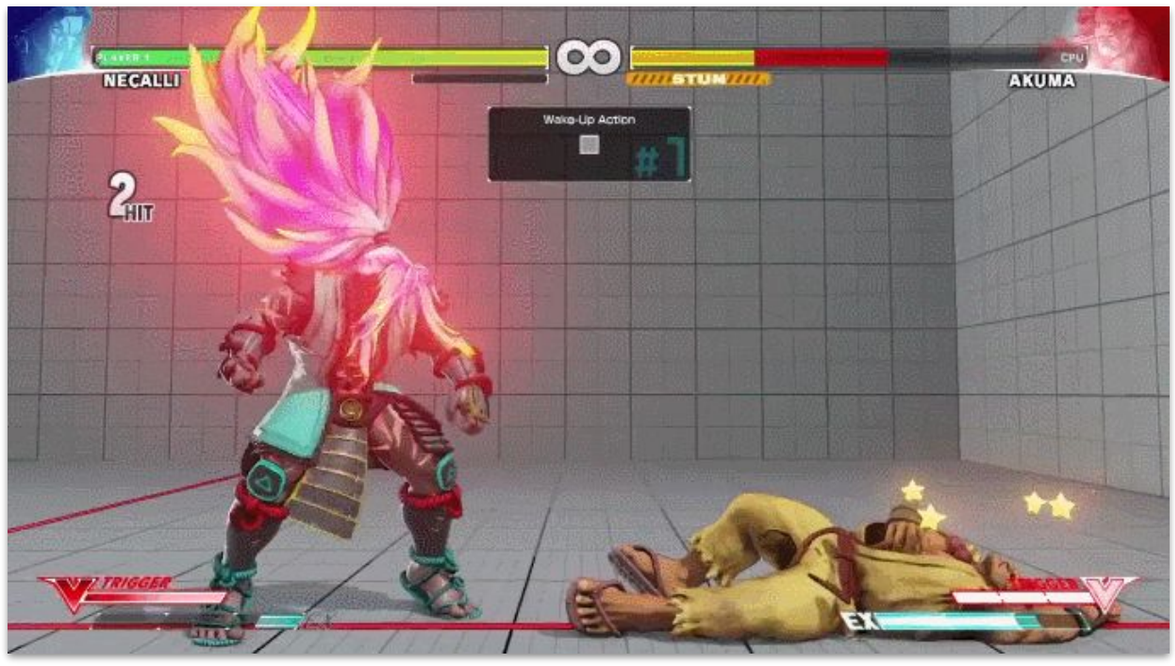


2.1. Combo differentiation

First main factor: the time between inputs

1) Use of **timing**: **NO**

2) Use of **timing**: **YES**



2.1.1. Time dependency

- Time-independent
  - **Single input**
- Time-dependent
  - **Single input**
  - **Parallel input**
  - **Single & Parallel input**

2.1.2. Immediate and holding input

Second main factor: the time pressing a key/button

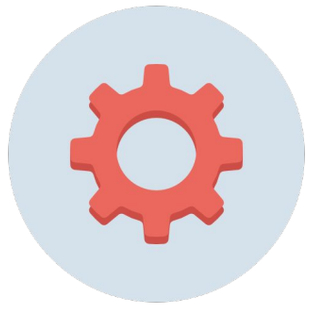
- Button pressed
  - **Immediate**
  - **Holding**

+ Frenzy, Action

- Frenzy, Action

2.1.3. Degree of freedom

Third main factor: the freedom of the inputs chain



- Input degrees of freedom
  - **Defined** → **Determined chains**, **Checked chains**
  - **Undefined** → ~~**Determined chains**~~, ~~**Checked chains**~~

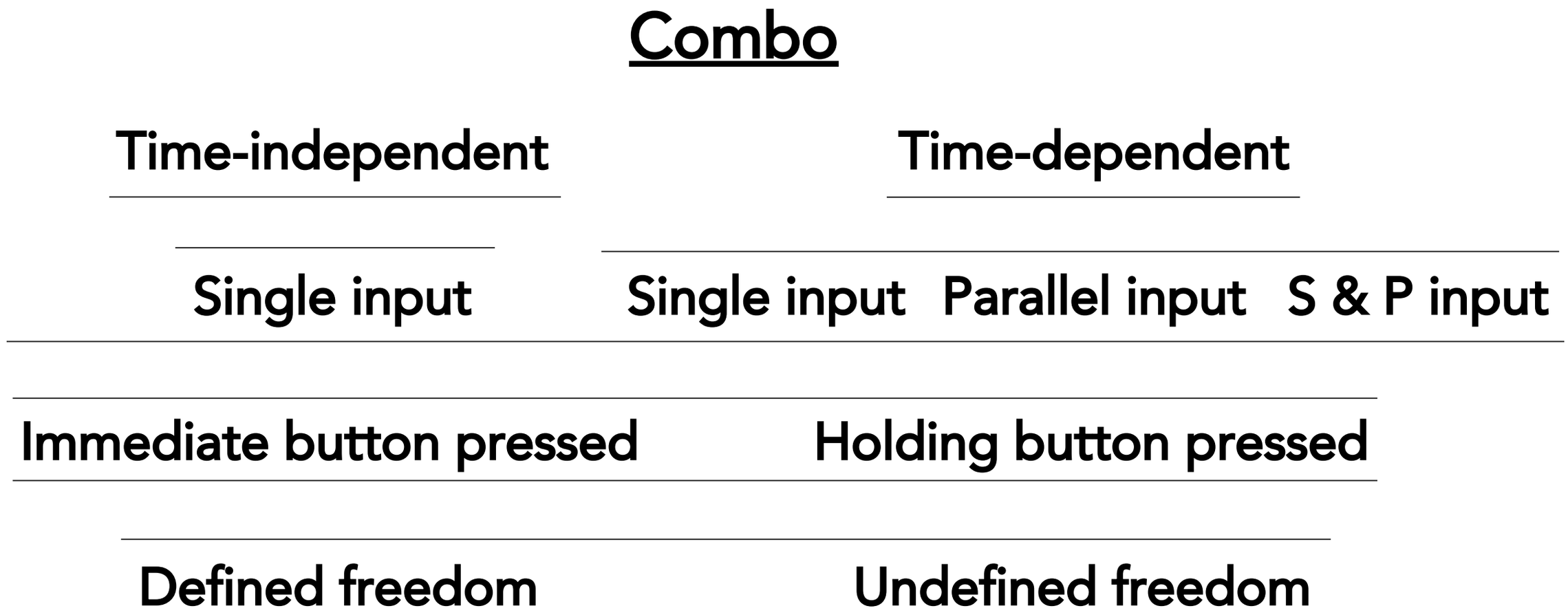
2.1.4. Definition & input scheme (I)

The ideal definition:

Combo: set of actions performed in sequence, with or without strict timing limitations, that yield a significant benefit or advantage.

2.1.4. Definition & input scheme (II)

Think about your type of input(s) you want in your videogame.

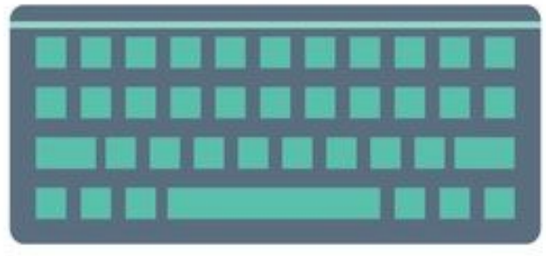


2. BLOCK II: CODE STRUCTURE

3.1. Input storage (I)

Keep in mind: we need to leave in evidence the buttons/keys we press!

Input tracking



3.1. Input storage (II)

Use of containers.

- **Vector** → Store the combos input events and the combos.
- **List** → Acts like a buffer. We store the actual user input events.
- **Queue** ✗
- **Tree** ✗

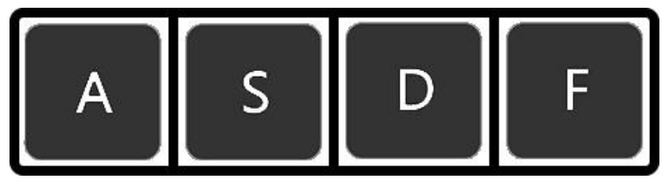
3.1. Input storage (III)

The combos need to be previously defined by us. Set up by xml.

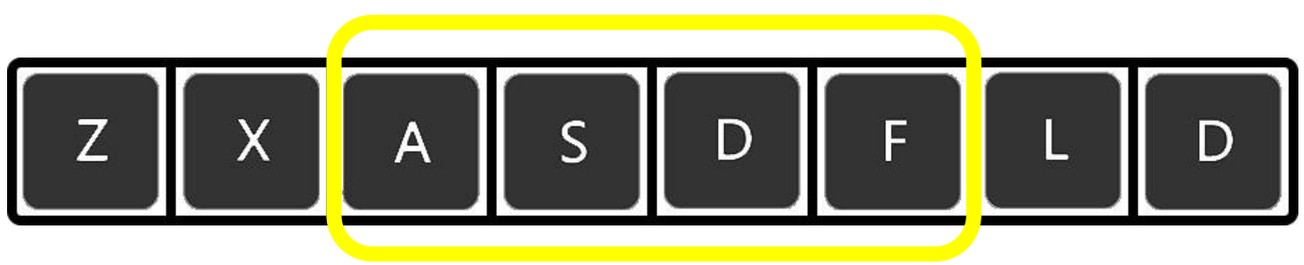
We will check if the array of the combo exists in our current buffer.

3.1. Input storage (IV)

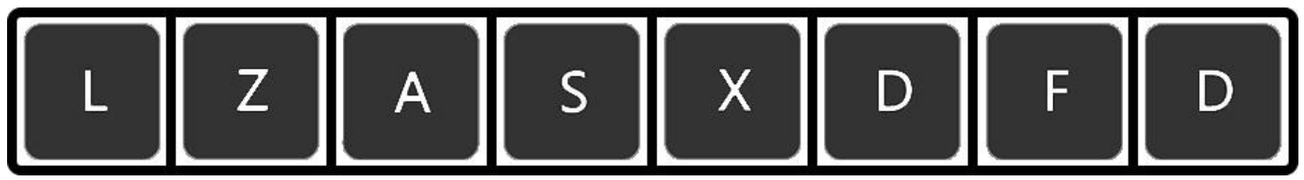
Sample defined combo →



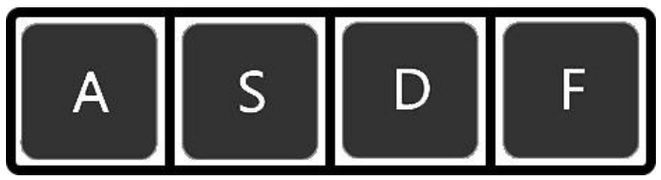
Buffer #1 →



Buffer #2 →



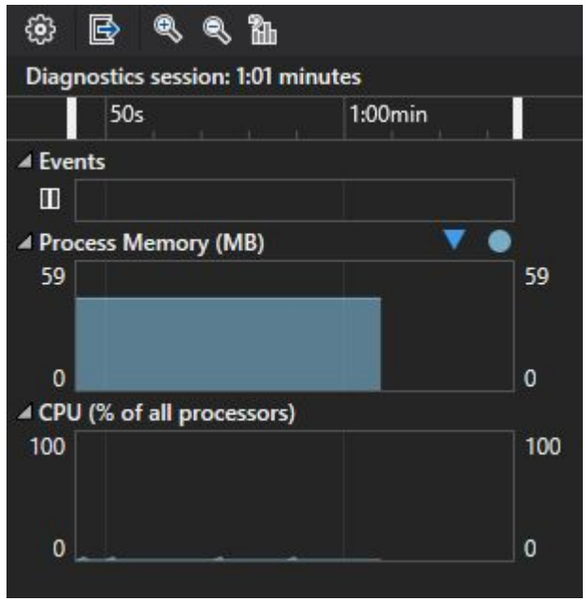
3.2. Memory management (I)



●●●

Note: dynamic memory!

We can’t really save all the inputs during all the time.



We need some rules to know when to delete them.

3.2. Memory management (II)

When we will delete the input events in the buffer?

- When a single input event lasts more than the maximum time allowed.

↓

Delete this event

- When the user completes a combo.

↓

Delete all the buffer elements

3.3. The implementation in-depth (I)

Application module → j1InputCombos

Main elements

- `std::list<InputEvent*> user_input_events;`

↓

Buffer

- `std::vector<InputCombo*> combos;`

3.3. The implementation in-depth (II)

InputEvent class

Main elements

- `j1PerfTimer timer;` → Crucial role in the class constructor!
- `CUSTOM_EVENT_TYPE type;`

```
InputEvent(CUSTOM_EVENT_TYPE type, bool use_of_timer = false);
```

Only use in the buffer

3.3. The implementation in-depth (III)

ComboEvent class

Main elements

- `std::vector<InputEvent*> vector_item;`

- `COMBO_NAME combo_name;`

4. CODE EXERCISES

```
if (we_code_it_ourselves)
{
    LOG("We learn effectively");
    learning.SetValue(100);
}
else
    learning.SetValue(10);
```

TODO 1

“Create another combo. Place any inputs you want! Guess what the attribute "name" of the combo should be. Investigate through the code for some clues. We can add another input_event type called "kick".”

Location: Input_Combos/Config/config.xml

TODO 1 - Solution

```
<input_combos>
  <combo name="hadouken">
    <input_event type="down"/>
    <input_event type="right"/>
    <input_event type="punch"/>
  </combo>
  <combo name="shoryuken">
    <input_event type="left"/>
    <input_event type="up"/>
    <input_event type="down"/>
    <input_event type="kick"/>
  </combo>
</input_combos>
```

TODO 2

"We need to fill every combo creation. Think about where we can push every input event to the combo. Hint -> we need to call a function located in InputCombo.h/.cpp. Notice another hint in the code."

Location: Input_Combos/Modules/j1InputCombos.cpp

TODO 2 - Solution

```
for (pugi::xml_node inp = comb.child("input_event"); inp; inp = inp.next_sibling("input_event")
{
    std::string event_name;
    event_name.assign(inp.attribute("type").as_string());

    InputEvent::CUSTOM_EVENT_TYPE event_type = InputEvent::CUSTOM_EVENT_TYPE::UNKNOWN;

    if (event_name == "left")
        event_type = InputEvent::CUSTOM_EVENT_TYPE::LEFT;
    else if (event_name == "up")
        event_type = InputEvent::CUSTOM_EVENT_TYPE::UP;
    else if (event_name == "right")
        event_type = InputEvent::CUSTOM_EVENT_TYPE::RIGHT;
    else if (event_name == "down")
        event_type = InputEvent::CUSTOM_EVENT_TYPE::DOWN;
    else if (event_name == "punch")
        event_type = InputEvent::CUSTOM_EVENT_TYPE::PUNCH;
    else if (event_name == "kick")
        event_type = InputEvent::CUSTOM_EVENT_TYPE::KICK;

    InputEvent* input_event = new InputEvent(event_type);
    combo->FillComboChain(input_event);
```

TODO 3

"We need to check and choose what keys we press (depending on the config.xml). If we press one of these keys, push this event to the user_input_events std::list. Hint -> Usage of ReturnEvent(parameter) function."

Location: Input_Combos/Modules/j1InputCombos.cpp

TODO 3 - Solution

```
if (App->input->GetKey(SDL_SCANCODE_LEFT) == KEY_DOWN)
{
    user_input_events.push_back(ReturnEvent(InputEvent::CUSTOM_EVENT_TYPE::LEFT));
}
if (App->input->GetKey(SDL_SCANCODE_UP) == KEY_DOWN)
{
    user_input_events.push_back(ReturnEvent(InputEvent::CUSTOM_EVENT_TYPE::UP));
}
if (App->input->GetKey(SDL_SCANCODE_RIGHT) == KEY_DOWN)
{
    user_input_events.push_back(ReturnEvent(InputEvent::CUSTOM_EVENT_TYPE::RIGHT));
}
if (App->input->GetKey(SDL_SCANCODE_DOWN) == KEY_DOWN)
{
    user_input_events.push_back(ReturnEvent(InputEvent::CUSTOM_EVENT_TYPE::DOWN));
}
if (App->input->GetKey(SDL_SCANCODE_Z) == KEY_DOWN)
{
    user_input_events.push_back(ReturnEvent(InputEvent::CUSTOM_EVENT_TYPE::PUNCH));
}
if (App->input->GetKey(SDL_SCANCODE_X) == KEY_DOWN)
{
    user_input_events.push_back(ReturnEvent(InputEvent::CUSTOM_EVENT_TYPE::KICK));
}
```

TODO 4

"First of all, uncomment the following block of code. This function deletes any input event that there is in the buffer Think about what should be the condition. Also, we need to place another line of code inside the condition block *. Hint #1 -> Remember what I said about the buffer? (What was the condition to delete an element). Hint #2-> There is a macro you need somewhere..."

Location: Input_Combos/Modules/j1InputCombos.cpp

TODO 4 - Solution

```cpp
if (user_input_events.size() > 0)
{
    std::list<InputEvent*>::const_iterator item = user_input_events.begin();
    while (item != user_input_events.end())
    {
        if ((*item)->timer.ReadMs() > INPUT_MAX_TIME)
        {
            delete *item;
            item = user_input_events.erase(item);
        }
        else
        {
            ++item;
        }
    }
}
```

TODO 5

"Set the player animation. There are two lines of code you need to place somewhere here... No hints this time."

Location: Input_Combos/Modules/j1InputCombos.cpp

TODO 5 - Solution

```
if (user_input_events.size() > 0)
{
    for (std::vector<InputCombo*>::const_iterator item = combos.begin(); item != combos.end(); item++)
    {
        if ((*item)->CheckCommonInput(user_input_events))
        {
            InputCombo::COMBO_NAME temp_name = (*item)->combo_name;
            switch (temp_name)
            {
            case InputCombo::COMBO_NAME::HADOUKEN:
                App->scene->SetPlayerAnimation(j1Scene::PLAYER_STATE::STATE_HADOUKEN);
                break;
            case InputCombo::COMBO_NAME::SHORYUKEN:
                App->scene->SetPlayerAnimation(j1Scene::PLAYER_STATE::STATE_SHORYUKEN);
                break;
            default:
                break;
            }

            ClearInputBuffer();

            break;
        }
    }
}
```

TODO 6

"Guess what we need to do here. Simple function call!"

Location: Input_Combos/Modules/j1InputCombos.cpp

TODO 6 - Solution

```
ClearInputBuffer();
```

Homework !

Investigate thoroughly all the code I implemented. See the relations between the scene and the module. Play with the classes I created, called:

- User_Input/InputEvent.h
- User_Input/InputCombo.h
- Modules/j1InputCombos.h

5. EXTRA CONCEPTS

Animation canceling & actions or colliders (I)

In our code we can cancel our animations by using another one. Good example in League of Legends:

Animation canceling & actions or colliders (II)

Animation cancelling is very rewarding but also very risky. Watch out for the actions and colliders!
Another example:

Improvements

- Controllers
- Colliders & actions
- Overall structure
- Adaptation to a state machine

Thank you for your attention