

DTD

https://www.w3schools.com/xml/xml_dtd_intro.asp

XML

In XML we have:

- tags
- attributes
- value of attributes
- content for tags.

```
<player position="attacker">Bale</player>
```

XML for movies

My XML has to have:

1. A root tag name called movies.
2. A set of movies (I don't know how many), where each one has:
 - a. Title <= This one for sure.
 - b. Nationality <= Well... this one, it's optional
 - c. Director or directors <= At least one for sure
 - d. Actors <= I don't know how many
 - e. Type <= a value between: adventure, science fiction, thriller or other.
 - f. Review <= a value between 1, 2, 3, 4 or 5, being 3 the default value.

XML for movies

```
<listOfMovies>
  <movie type="science fiction" review="5">
    <name>Star Wars</name>
    <nationality>USA</nationality>
    <director>G. Lucas</director>
    <actor>H. Ford</actor>
    <actor>M. Hamill</actor>
  </movie>
  <movie type="adventure" review="3">
    <name>Indiana Jones</name>
    <director>G. Lucas</director>
  </movie>
</listOfMovies>
```

Internal DTD (there is a *external* also)

```
<?xml version="1.0">
```

```
<!DOCTYPE rootNode [
```

```
    <!-- Elements -->
```

```
]>
```

```
<?xml version="1.0">
```

```
<!DOCTYPE listOfMovies [
```

```
    <!-- Movies -->
```

```
]>
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

Elements

<!ELEMENT *elementName* *elementContent* **>**

Defining only text

<!ELEMENT *name* **(#PCDATA)** **>**

<!ELEMENT *nationality* **(#PCDATA)** **>**

<!ELEMENT *director* **(#PCDATA)** **>**

<!ELEMENT *actor* **(#PCDATA)** **>**

Elements

<!ELEMENT *elementName* *elementContent* **>**

Defining tags in tags

```
<movie type="science fiction" review="5">  
  <name>Star Wars</name>  
  <nationality>USA</nationality>  
  <director>G. Lucas</director>  
  <actor>H. Ford</actor>  
  <actor>M. Hamill</actor>  
</movie>
```


Elements

<!ELEMENT *elementName* *elementContent* **>**

If we need one and only one tag in a tag, like this:

```
<movie>  
  <name>Star Wars</name>  
</movie>
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

If we need one and only one tag in a tag, like this:

```
<movie>  
  <name>Star Wars</name>  
</movie>
```

Our DTD is:

```
<!ELEMENT movie (name)>  
<!ELEMENT name (#PCDATA) >
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

What happens if we want also nationality?

```
<movie>
  <name>Star Wars</name>
  <nationality>USA</nationality>
</movie>
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

What happens if we want also nationality?

```
<movie>
  <name>Star Wars</name>
  <nationality>USA</nationality>
</movie>
```

DTD

```
<!ELEMENT movie (name, nationality)>
<!ELEMENT name (#PCDATA) >
<!ELEMENT nationality (#PCDATA) >
```

Elements

`<!ELEMENT elementName elementContent >`

But... nationality... it is optional

Elements

<!ELEMENT *elementName* *elementContent* **>**

What happens if we want also nationality?

```
<movie>
  <name>Star Wars</name>
  <nationality>USA</nationality>
</movie>
```

DTD

```
<!ELEMENT movie (name, nationality?)>
<!ELEMENT name    (#PCDATA) >
<!ELEMENT nationality    (#PCDATA) >
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

DTD

<!ELEMENT movie (name, **nationality?)>**

<!ELEMENT name (#PCDATA) >

<!ELEMENT nationality (#PCDATA) >

```
<movie>
  <name>Star Wars</name>
  <nationality>USA</nationality>
</movie>
```

```
<movie>
  <name>Star Wars</name>
</movie>
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

We wanted to have at least one director... or maybe more.

Elements

`<!ELEMENT elementName elementContent >`

We wanted to have at least one director... or maybe more.

```
<!ELEMENT movie (name, nationality?, director+)>
```

```
<!ELEMENT name (#PCDATA) >
```

```
<!ELEMENT nationality (#PCDATA) >
```

```
<!ELEMENT director (#PCDATA)>
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

We wanted to have at least one director... or maybe more.

```
<!ELEMENT movie (name, nationality?, director+)>
```

```
<!ELEMENT name (#PCDATA) >
```

```
<!ELEMENT nationality (#PCDATA) >
```

```
<!ELEMENT director (#PCDATA)>
```

```
<movie>
```

```
  <name>A movie</name>
```

```
  <director>One</director>
```

```
</movie>
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

We wanted to have at least one director... or maybe more.

```
<!ELEMENT movie (name, nationality?, director+)>
```

```
<!ELEMENT name (#PCDATA) >
```

```
<!ELEMENT nationality (#PCDATA) >
```

```
<!ELEMENT director (#PCDATA)>
```

```
<movie>
```

```
  <name>A movie</name>
```

```
  <director>One</director>
```

```
  <director>Two</director>
```

```
</movie>
```

Elements

`<!ELEMENT elementName elementContent >`

We wanted to have from zero to ... I don't know how many actors.

Elements

<!ELEMENT *elementName* *elementContent* **>**

We wanted to have at least one director... or maybe more.

```
<!ELEMENT movie (name, nationality?, director+, actor*)>
<!ELEMENT name  (#PCDATA) >
<!ELEMENT nationality  (#PCDATA) >
<!ELEMENT director  (#PCDATA)>
<!ELEMENT actor  (#PCDATA) >
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

We wanted to have at least one director... or maybe more.

```
<!ELEMENT movie (name, nationality?, director+, actor*)>
```

```
<!ELEMENT name (#PCDATA) >
```

```
<!ELEMENT nationality (#PCDATA) >
```

```
<!ELEMENT director (#PCDATA)>
```

```
<!ELEMENT actor (#PCDATA) >
```

```
<movie>
```

```
  <name>A movie</name>
```

```
  <director>One</director>
```

```
  <!-- no actors -->
```

```
</movie>
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

We wanted to have at least one director... or maybe more.

```
<!ELEMENT movie (name, nationality?, director+, actor*)>
```

```
<!ELEMENT name (#PCDATA) >
```

```
<!ELEMENT nationality (#PCDATA) >
```

```
<!ELEMENT director (#PCDATA)>
```

```
<!ELEMENT actor (#PCDATA) >
```

```
<movie>
```

```
  <name>A movie</name>
```

```
  <director>One</director>
```

```
  <actor>First actor</actor>
```

```
</movie>
```

Elements

<!ELEMENT *elementName* *elementContent* **>**

We wanted to have at least one director... or maybe more.

```
<!ELEMENT movie (name, nationality?, director+, actor*)>  
<!ELEMENT name (#PCDATA) >  
<!ELEMENT nationality (#PCDATA) >  
<!ELEMENT director (#PCDATA)>  
<!ELEMENT actor (#PCDATA) >
```

```
<movie>  
  <name>A movie</name>  
  <director>One</director>  
  <actor>First actor</actor>  
  <actor>Second actor</actor>  
</movie>
```


Special cases for elements

Sometimes, we want to have a special element.

For example, we want to mark ours movies with a classification: everybody, over-18 and over-13.

Let's gonna start taking into account only “everybody”.

The empty element

We want to mark a movie like this:

```
<movie>  
  <name>Mickey Mouse</name>  
  <everybody/>  
</movie>
```

And we never want any content in that “everybody” tag.

The empty element

We want to mark a movie like this:

```
<movie>  
  <name>Mickey Mouse</name>  
  <everybody/>  
</movie>
```

The DTD is:

```
<!ELEMENT movie (name, everybody)>  
<!ELEMENT name (#PCDATA)>  
<!ELEMENT everybody EMPTY>
```

Special cases for elements

The “choose between only one” selector.

Remember that we wanted to mark a movie with: everybody, over-18 and over-13.

Well... there is a way to allow the DTD to select between several options.

The empty element

We want all these XML are valid.

```
<movie>
  <name>Mickey Mouse</name>
  <everybody/>
</movie>
```

```
<movie>
  <name>Star Wars</name>
  <over-13/>
</movie>
```

```
<movie>
  <name>Die Hard</name>
  <over-18/>
</movie>
```

The empty element

We get that with:

```
<!ELEMENT movie (name, (everybody | over-13 | over-18))>  
<!ELEMENT name (#PCDATA)>  
<!ELEMENT everybody EMPTY>  
<!ELEMENT over-13 EMPTY>  
<!ELEMENT over-18 EMPTY>
```

We can use the “choose between several” option with any element, not only with the empty ones.