Introduction to XML Schema Document (XSD) visualization

Part II: HTML documentation

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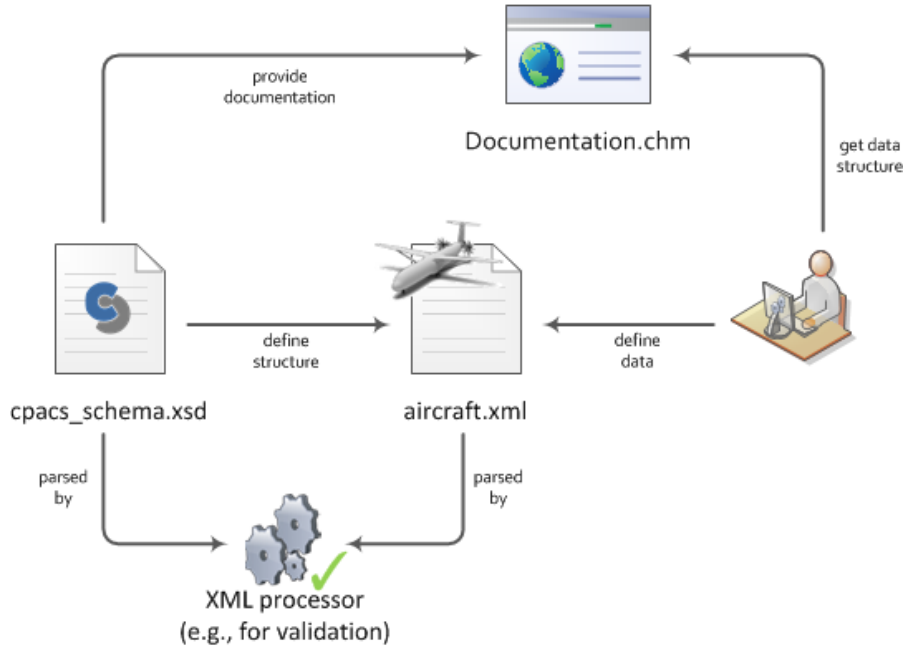
What is a schema?

- A schema* is itself an XML file (**.xsd*), which defines the rules/syntax how a CPACS file (**.xml*) may be structured:
  - how often and in which order may elements appear
  - what is the type of elements (string, double, complex type with sub-elements, etc.)

summarized as *type* of an element

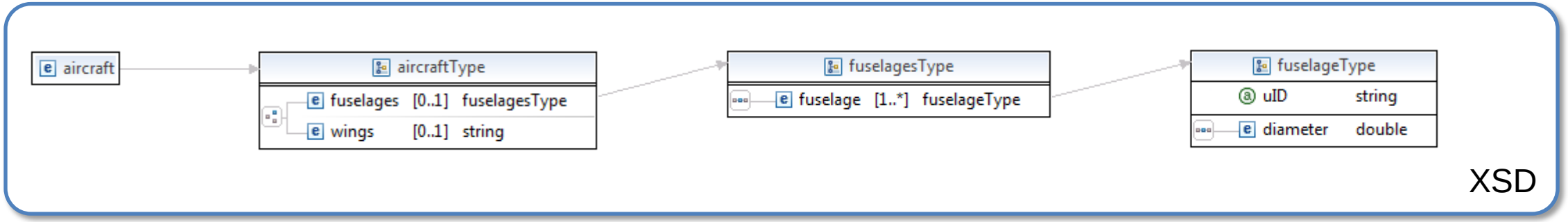


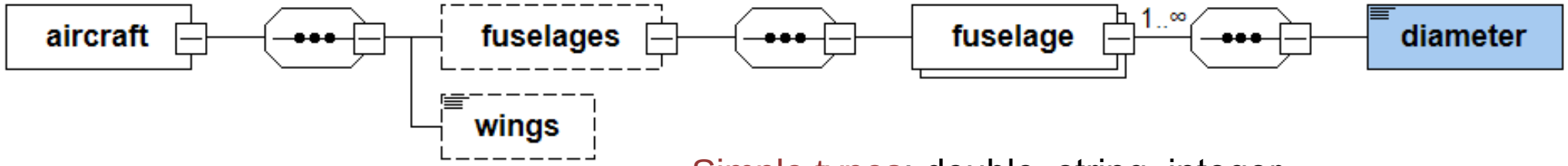

```
- <xsd:complexType name="aircraftType">
  - <xsd:annotation>
    - <xsd:appinfo>
      - <sd:schemaDoc>
        - <ddue:summary>
            <ddue:para>aircraftType</ddue:para>
          </ddue:summary>
        - <ddue:remarks>
            <ddue:para>Aircraft type, containing all the aircraft models</ddue:para>
          </ddue:remarks>
        </sd:schemaDoc>
      </xsd:appinfo>
    </xsd:annotation>
  - <xsd:complexContent>
    - <xsd:extension base="complexBaseType">
      - <xsd:sequence>
          <xsd:element maxOccurs="unbounded" name="model" type="aircraftModelType" />
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
```

*) in IT called *schema* and not *scheme*..

What are elements and types?

Simplified example similar to CPACS





- Simple types: double, string, integer …
- Complex types: specify sub-elements and attributes of elements

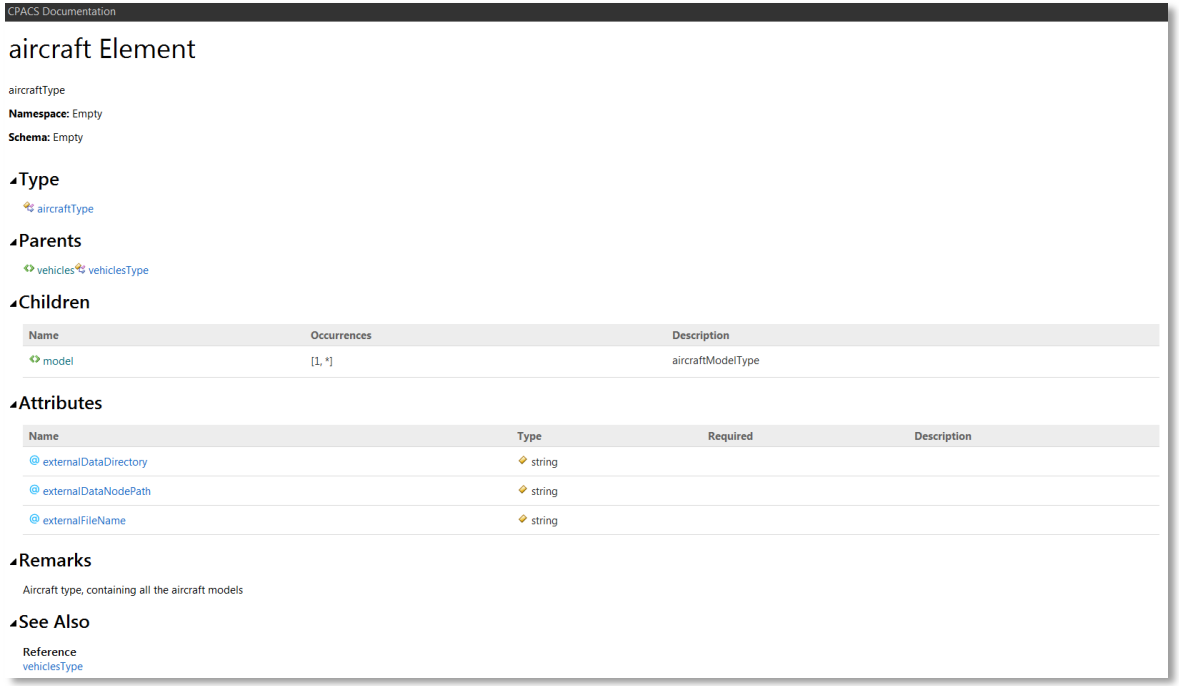
  → used to build hierarchical structure

HTML documentation

Where does the content of the documentation come from?

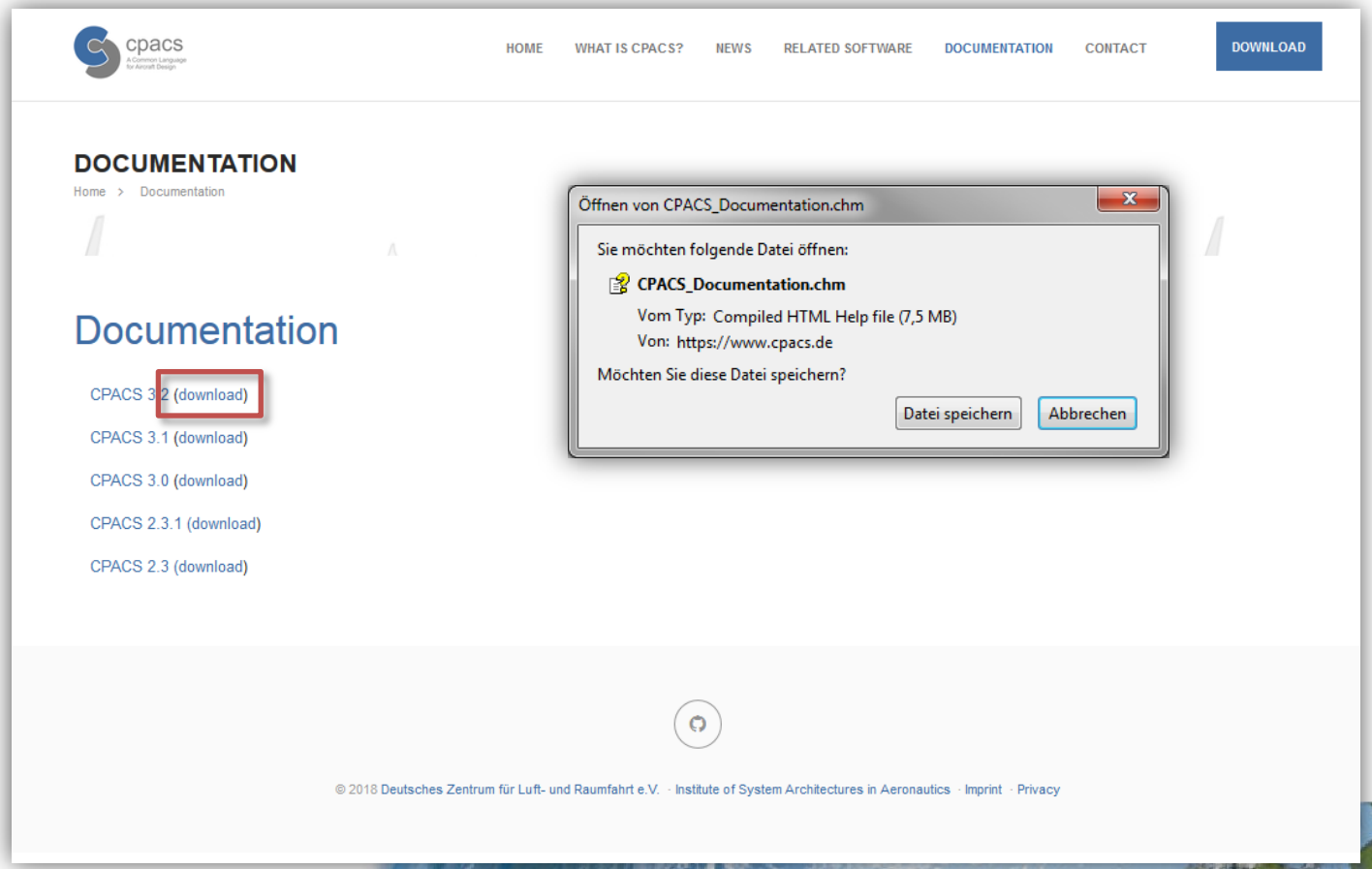
- Content of the CPACS schema (*cpacs_schema.xsd*) is parsed by *Sandcastle Helpfile Builder* (see GitHub for more details)
- <*xsd:annotation*> node in the CPACS schema (*cpacs_schema.xsd*) contains all documentation

```
- <xsd:complexType name="aircraftType">
  - <xsd:annotation>
    - <xsd:appinfo>
      - <sd:schemaDoc>
        - <ddue:summary>
            <ddue:para>aircraftType</ddue:para>
          </ddue:summary>
        - <ddue:remarks>
            <ddue:para>Aircraft type, containing all the aircraft models</ddue:para>
          </ddue:remarks>
        </sd:schemaDoc>
      </xsd:appinfo>
    </xsd:annotation>
  - <xsd:complexContent>
    - <xsd:extension base="complexBaseType">
      - <xsd:sequence>
          <xsd:element maxOccurs="unbounded" name="model" type="aircraftModelType" />
        </xsd:sequence>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
```



HTML documentation
How to get the documentation?

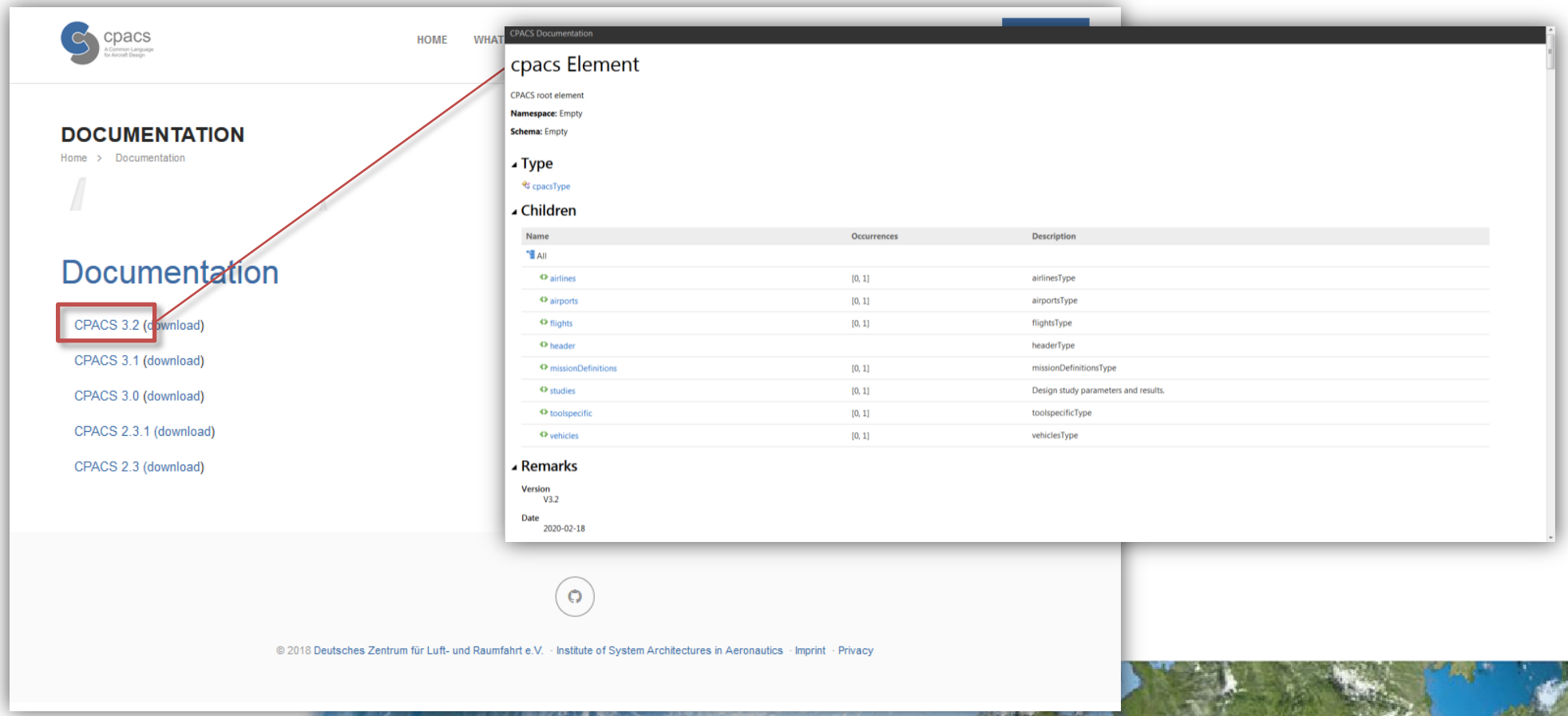
- Option 1: executable (*CPACS_Documentation.chm*) at cpacs.de
  - https://cpacs.de/pages/documentation.html



HTML documentation

How to get the documentation?

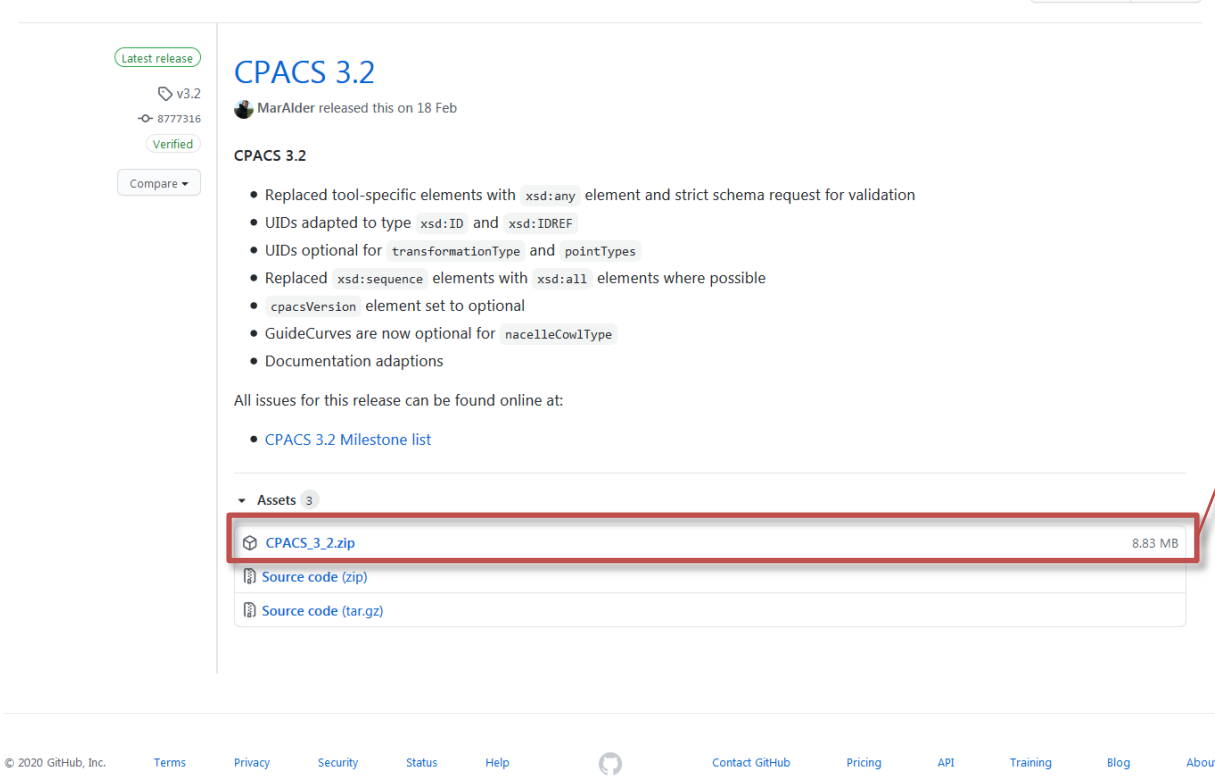
- Option 2: online documentation at cpacs.de → https://cpacs.de/pages/documentation.html

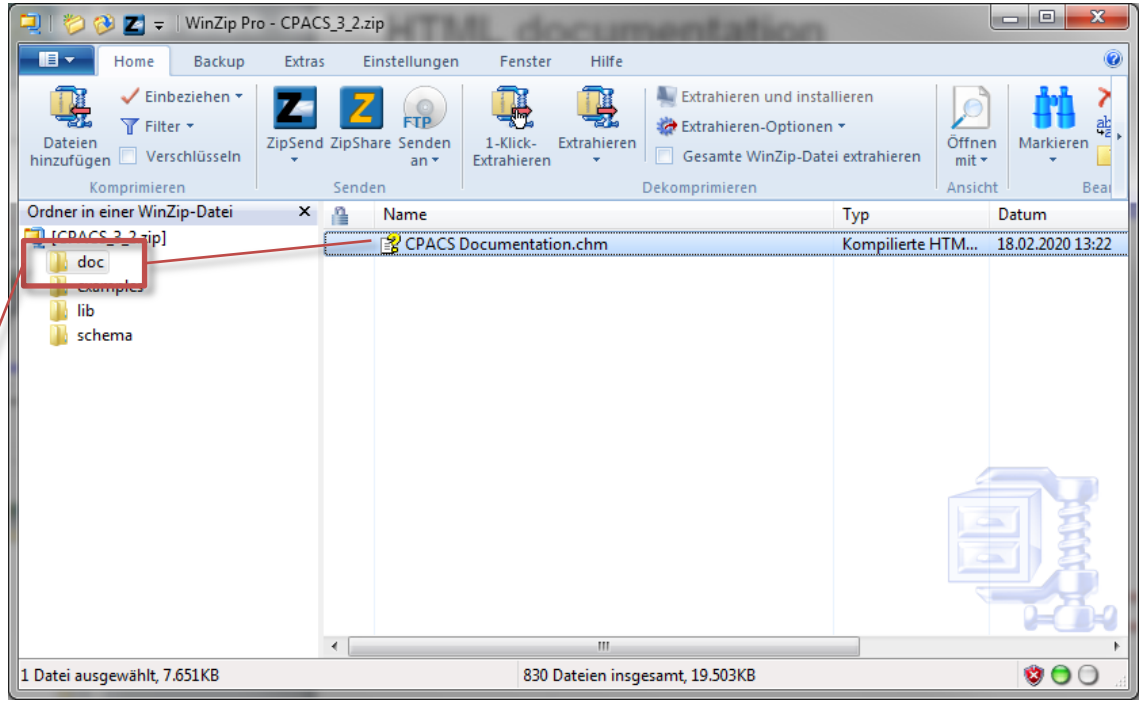


HTML documentation

How to get the documentation?

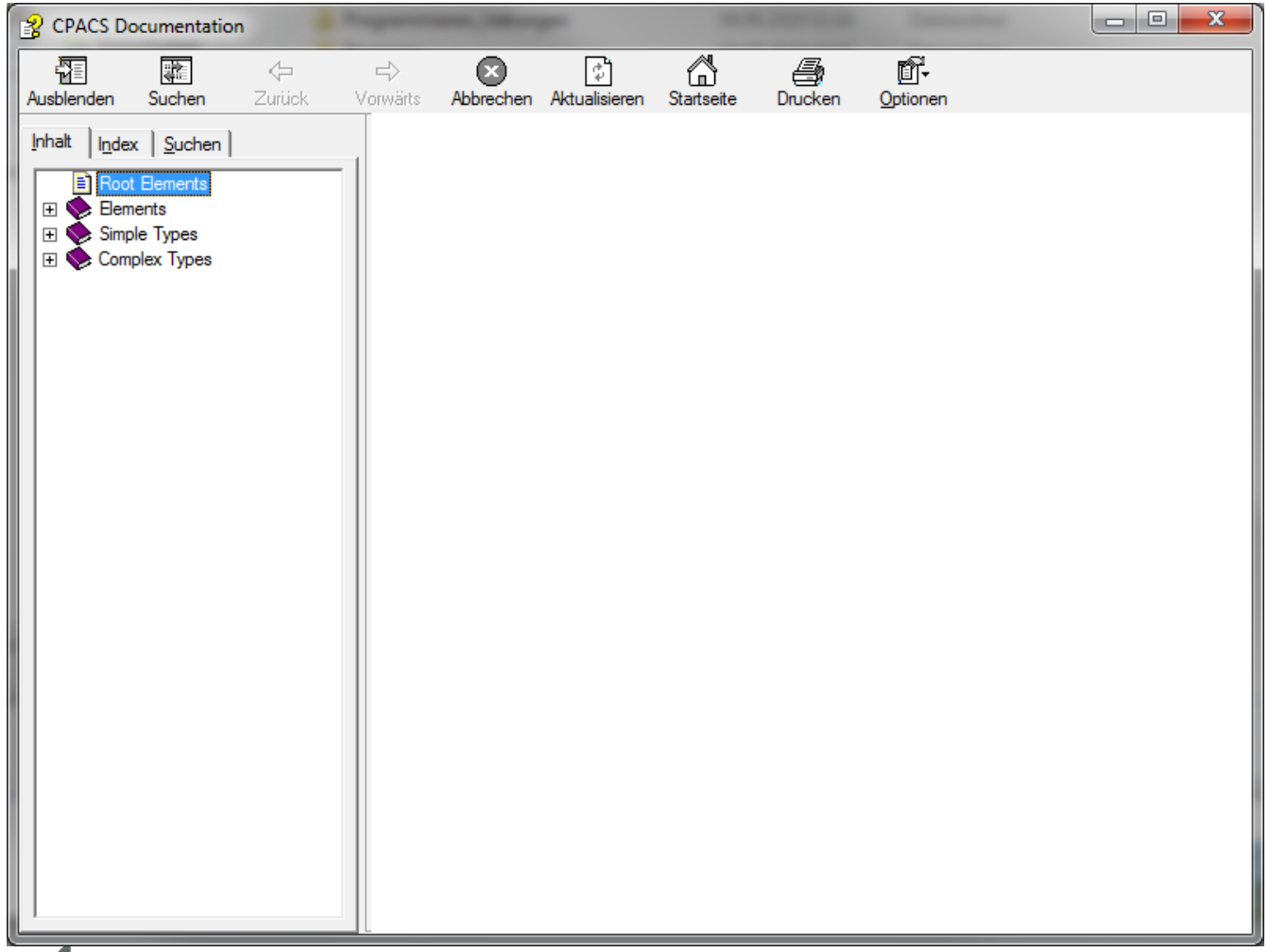
- Option 3: latest GitHub build containing the compiled documentation (*CPACS Documentation.chm*)
  - e.g. https://github.com/DLR-SL/CPACS/releases/tag/v3.2





HTML documentation

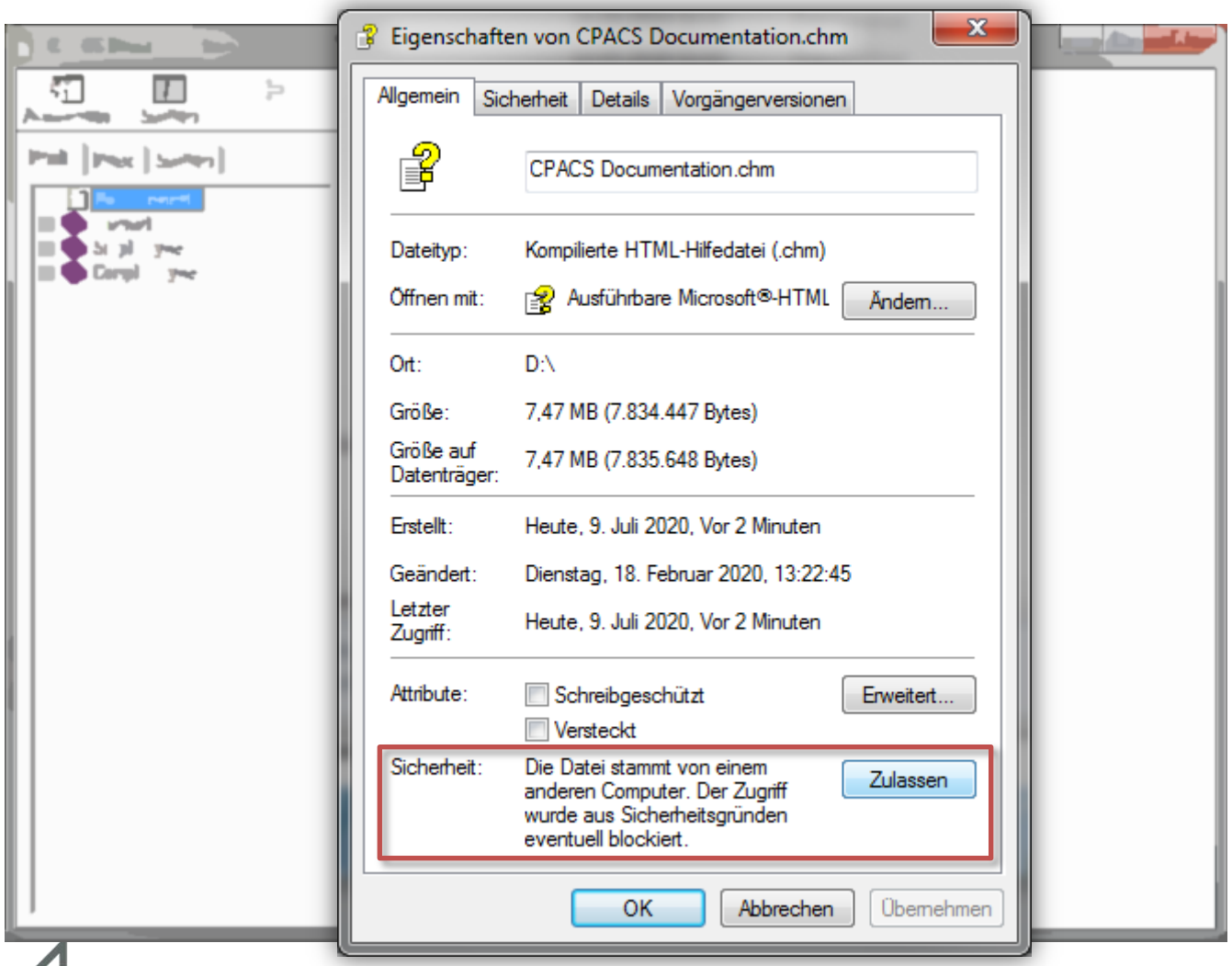
How to get the documentation?



- The actual content might not be displayed (only empty white background)

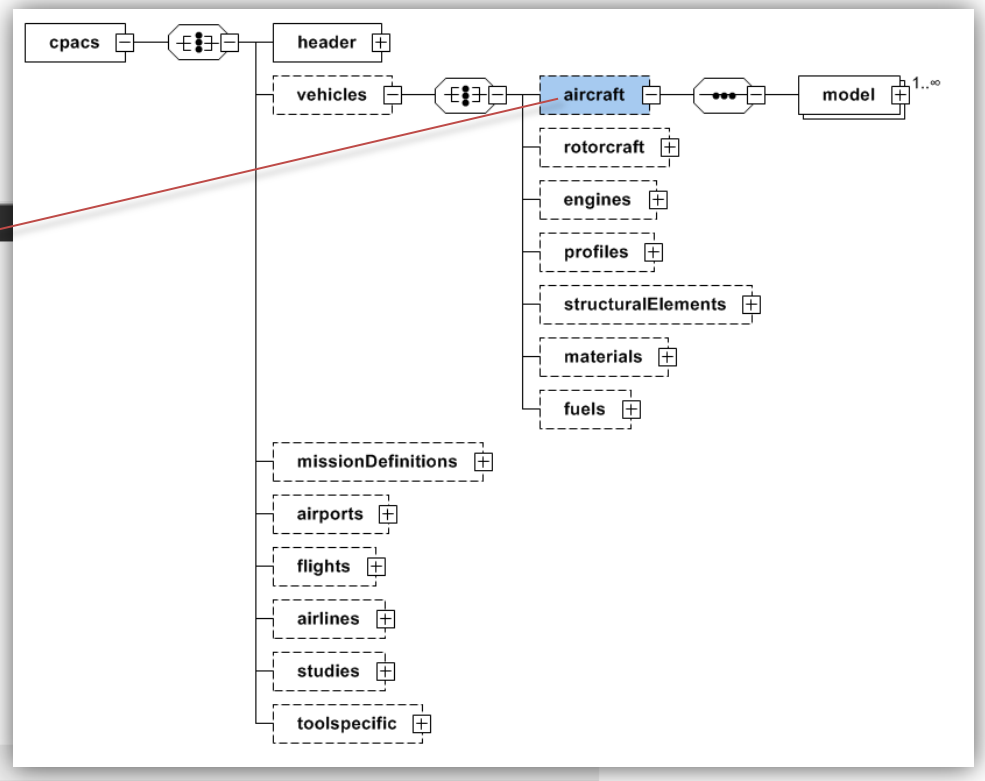
HTML documentation

How to get the documentation?



- The actual content might not be displayed (only empty white background)
- Right click on *CPACS Documentation.chm* and allow the content from another computer to be accessed

HTML documentation



CPACS Documentation

aircraft Element

element name

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

Name	Type	Required	Description
externalDataDirectory	string		
externalDataNodePath	string		
externalFileName	string		

Remarks

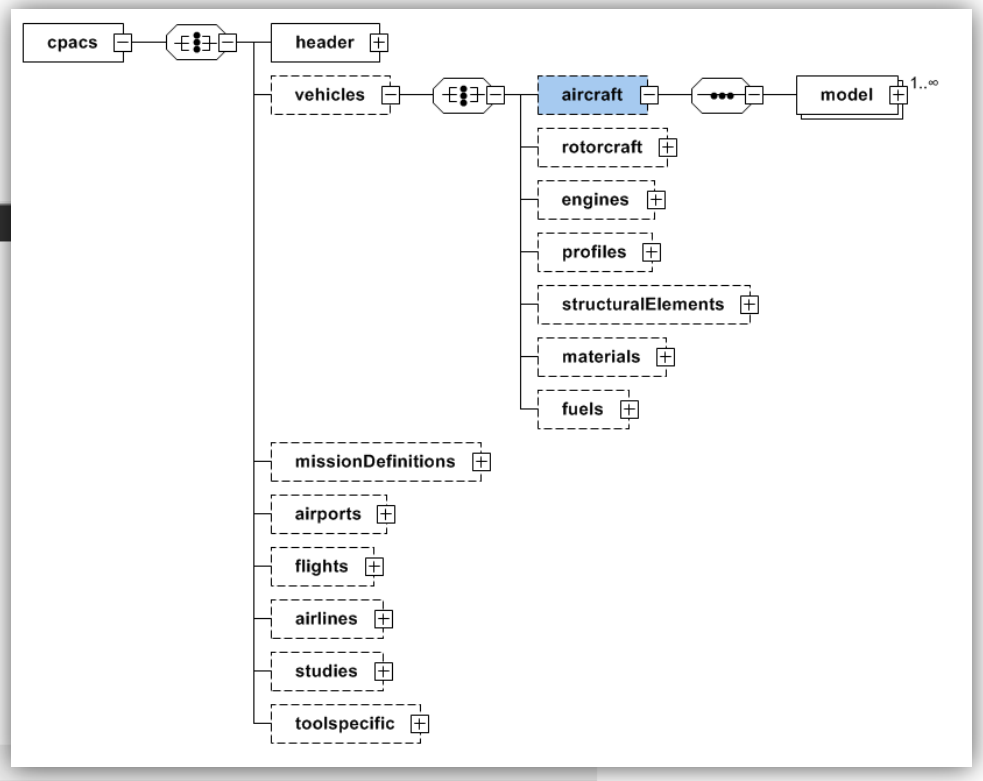
Aircraft type, containing all the aircraft models

See Also

Reference
vehiclesType

DLR

HTML documentation



CPACS Documentation

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

type of the element

Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

Name	Type	Required	Description
@ externalDataDirectory	string		
@ externalDataNodePath	string		
@ externalFileName	string		

Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
vehiclesType

HTML documentation

CPACS Documentation

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

Parents

vehicles vehiclesType

Children

child element

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

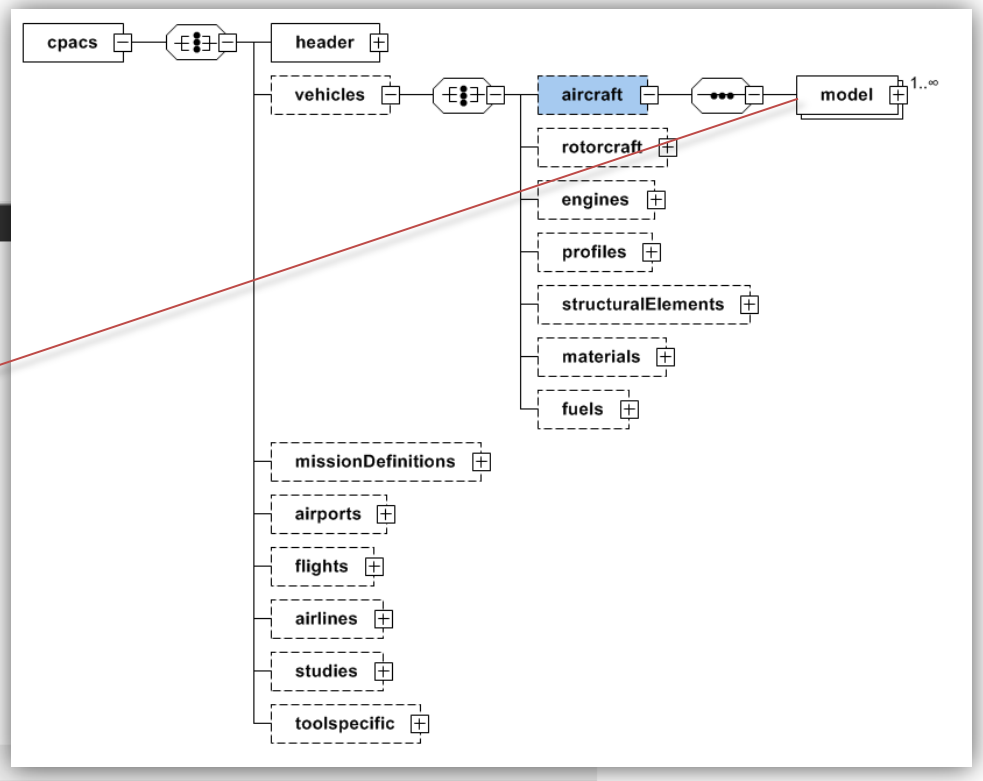
Name	Type	Required	Description
externalDataDirectory	string		
externalDataNodePath	string		
externalFileName	string		

Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
vehiclesType



HTML documentation

CPACS Documentation

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

Name	Type	Required	Description
externalDataDirectory	string		
externalDataNodePath	string		
externalFileName	string		

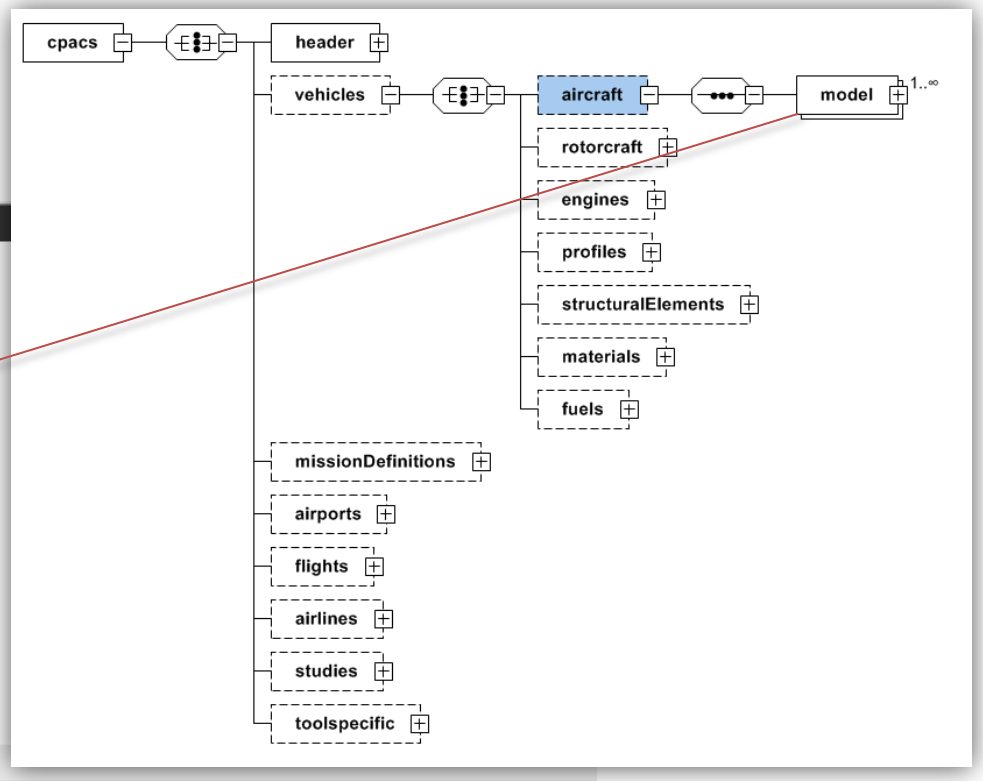
Remarks

Aircraft type, containing all the aircraft models

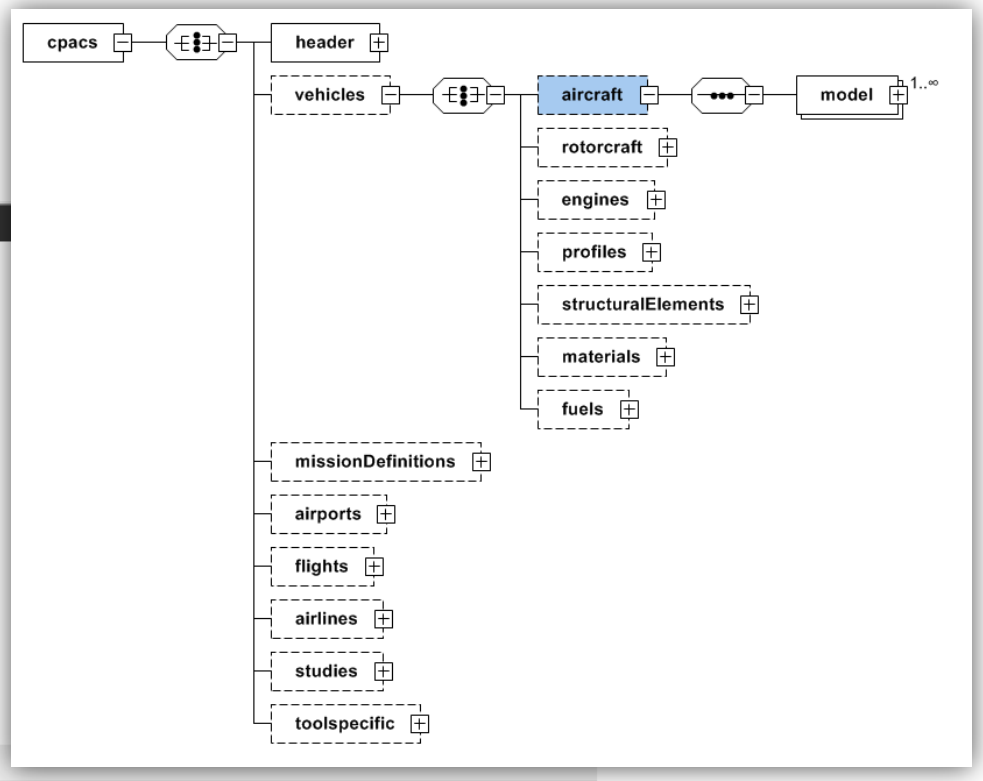
See Also

Reference
vehiclesType

occurene of the child element



HTML documentation



CPACS Documentation

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

short description of the element

(sometimes just contains the type‘s name)

Type

aircraftType

Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

Name	Type	Required	Description
externalDataDirectory	string		
externalDataNodePath	string		
externalFileName	string		

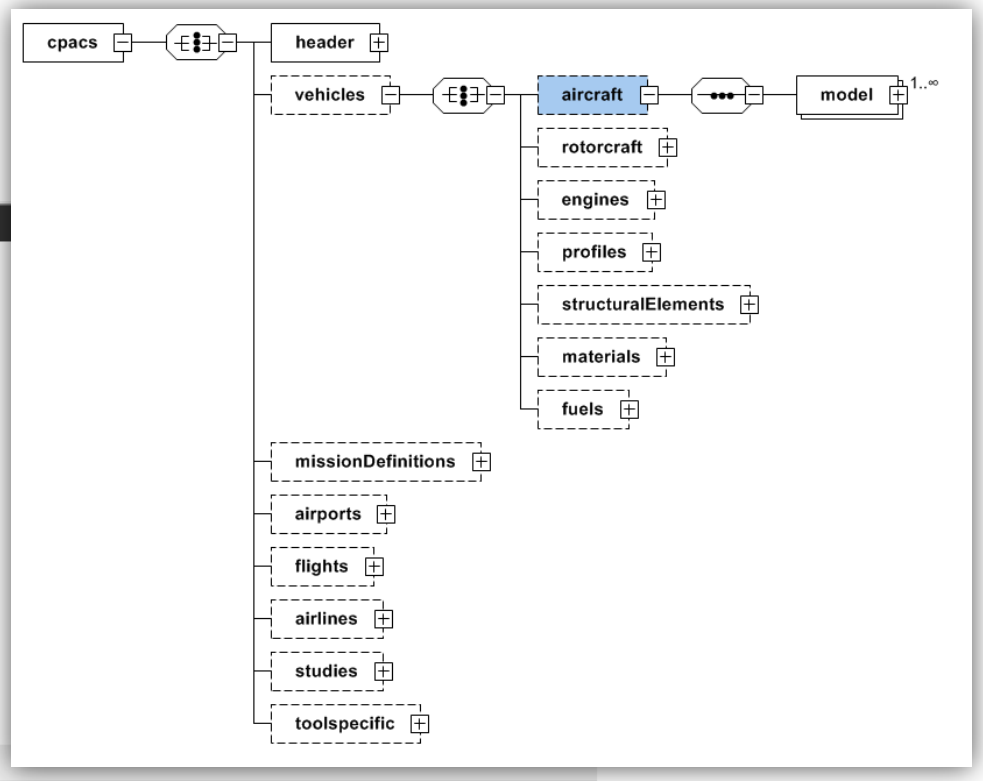
Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
vehiclesType

HTML documentation



CPACS Documentation

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

Parents

vehicles vehiclesType

list of available attributes

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

Name	Type	Required	Description
@ externalDataDirectory	string		
@ externalDataNodePath	string		
@ externalFileName	string		

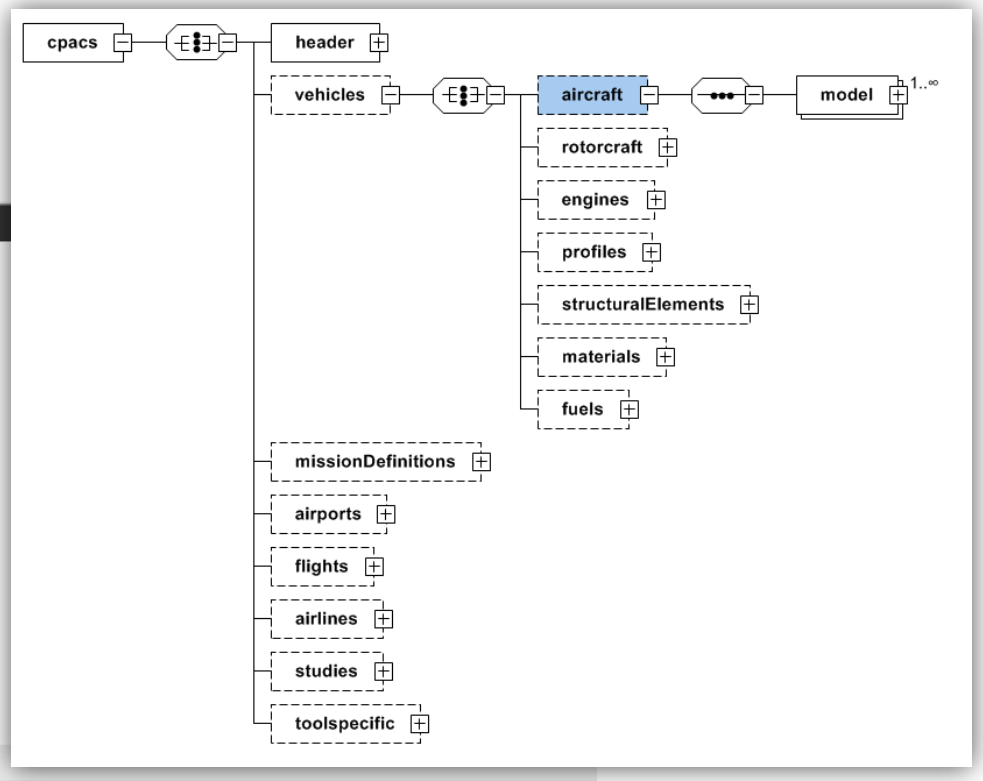
Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
vehiclesType

HTML documentation



CPACS Documentation

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

Parents

vehicles vehiclesType

type of the attributes

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

Name	Type	Required	Description
@ externalDataDirectory	string		
@ externalDataNodePath	string		
@ externalFileName	string		

Remarks

Aircraft type, containing all the aircraft models

See Also

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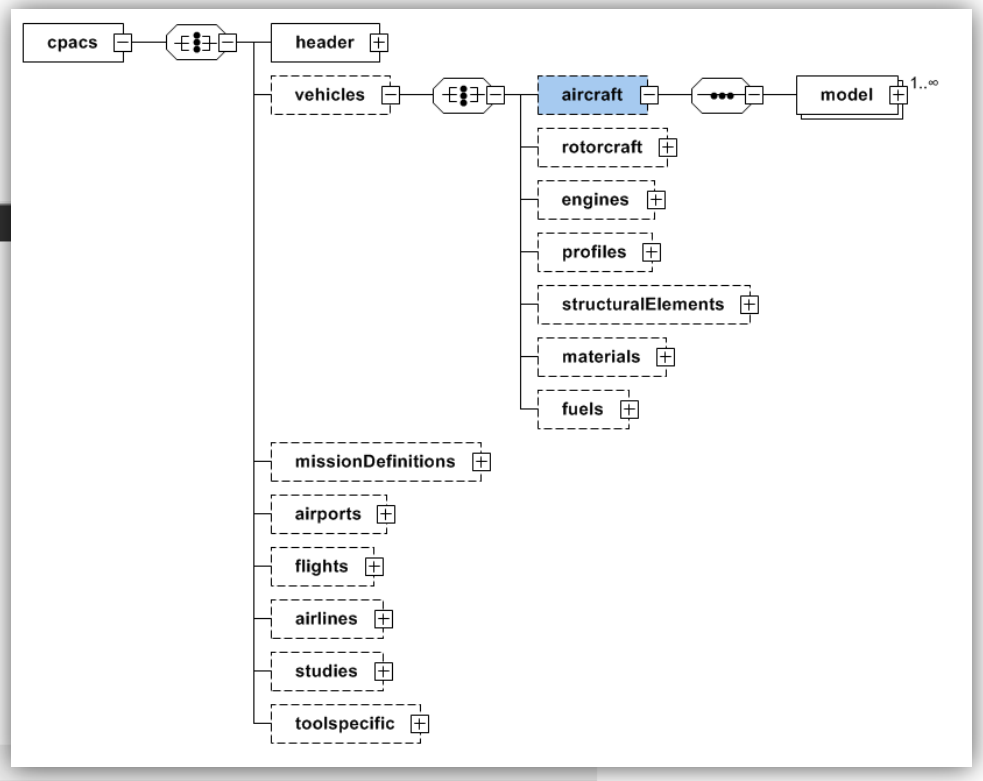
HTML documentation



CPACS Documentation

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

occurrence of the attributes

empty = optional

“Yes” = required

Attributes

Name	Type	Required	Description
@ externalDataDirectory	string		
@ externalDataNodePath	string		
@ externalFileName	string		

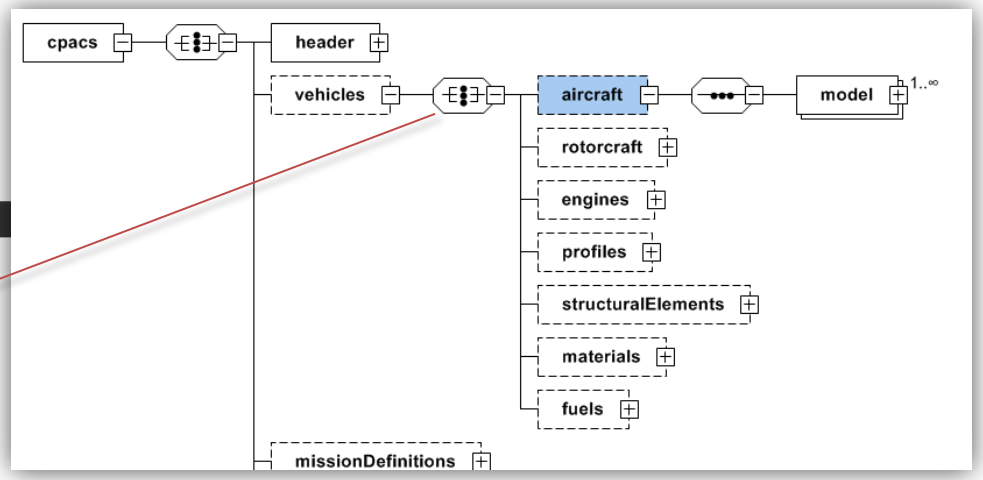
Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
vehiclesType

HTML documentation



CPACS Documentation

cpacs Element

CPACS root element

Namespace: Empty

Schema: Empty

order of appearance

Type

cpacsType

Children

Name	Occurrences	Description
All		
airlines	[0, 1]	airlinesType
airports	[0, 1]	airportsType
flights	[0, 1]	flightsType
header		headerType
missionDefinitions	[0, 1]	missionDefinitionsType
studies	[0, 1]	Design study parameters and results.
toolspecific	[0, 1]	toolspecificType
vehicles	[0, 1]	vehiclesType

Remarks

Version
V3.2

Date
2020-02-18

- Sequence is arbitrary (i.e. it does not matter whether *aircraft* is specified first and then *engines* or vice versa)

- Sequence must correspond to the representation in the XSD diagram

- Only one of the nodes may be specified (=*choice element*):

HTML documentation
Summary

- Navigate through the CPACS hierarchy by clicking on  for parent or child elements
- Check the occurrence (e.g., [0..1], [1..*], etc.)
- Check order of appearance: 
- Get list of attributes 
- Get further information about the type