

Introduction to XML Schema Document (XSD) visualization

Part II: HTML documentation

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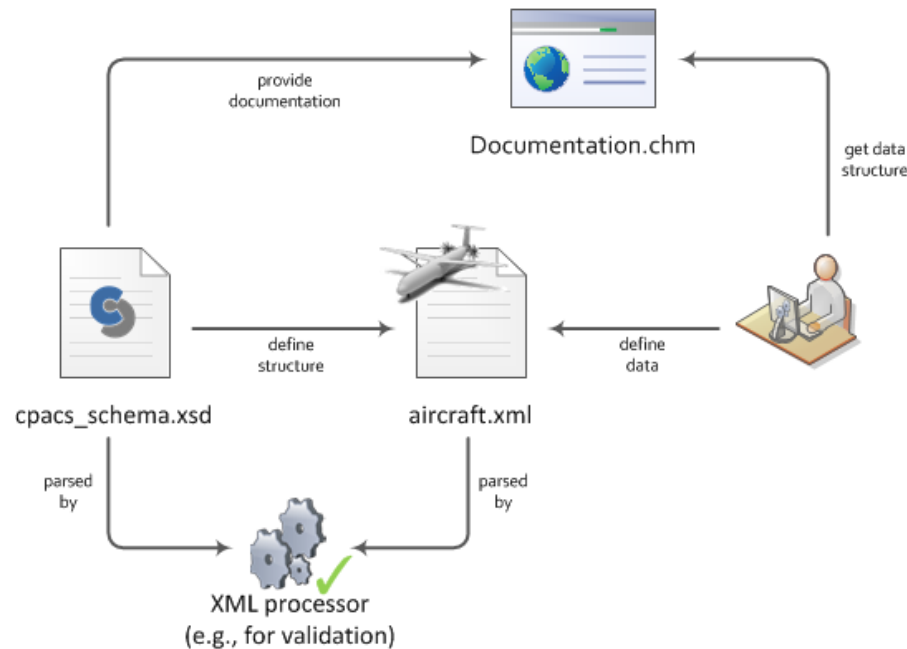
DLR Institute of System Architectures in Aeronautics
Hamburg

A large, high-resolution image of the Earth as seen from space, showing the curvature of the planet, blue oceans, white clouds, and green landmasses. The image is positioned on the right side of the slide, partially overlapping the text.

Knowledge for Tomorrow

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* 🧩



```

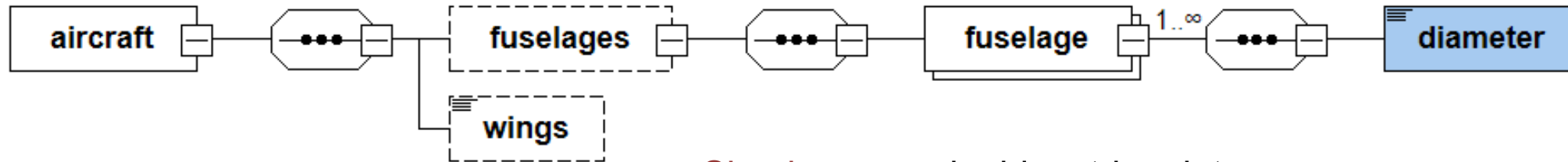
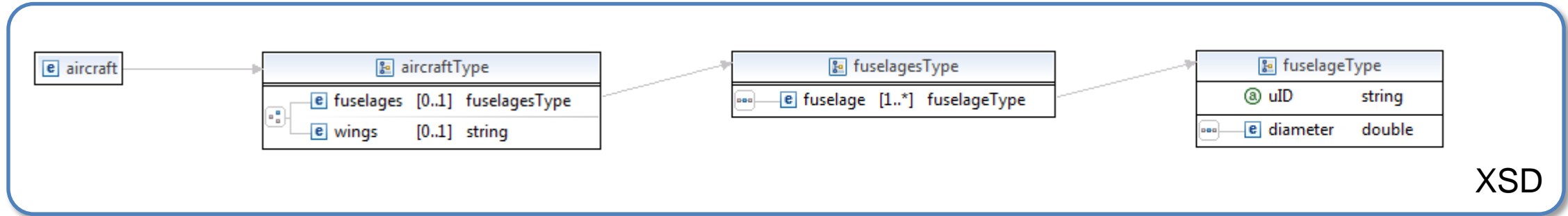
- <xsd:complexType name="aircraftType">
-   <xsd:annotation>
-     <xsd:appinfo>
-       <sd:schemaDoc>
-         <ddue:summary>
-           <ddue:para>aircraftType</ddue:para>
-         </ddue:summary>
-         <ddue:remarks>
-           <ddue:para>Aircraft type, containing all the aircraft models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

```

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

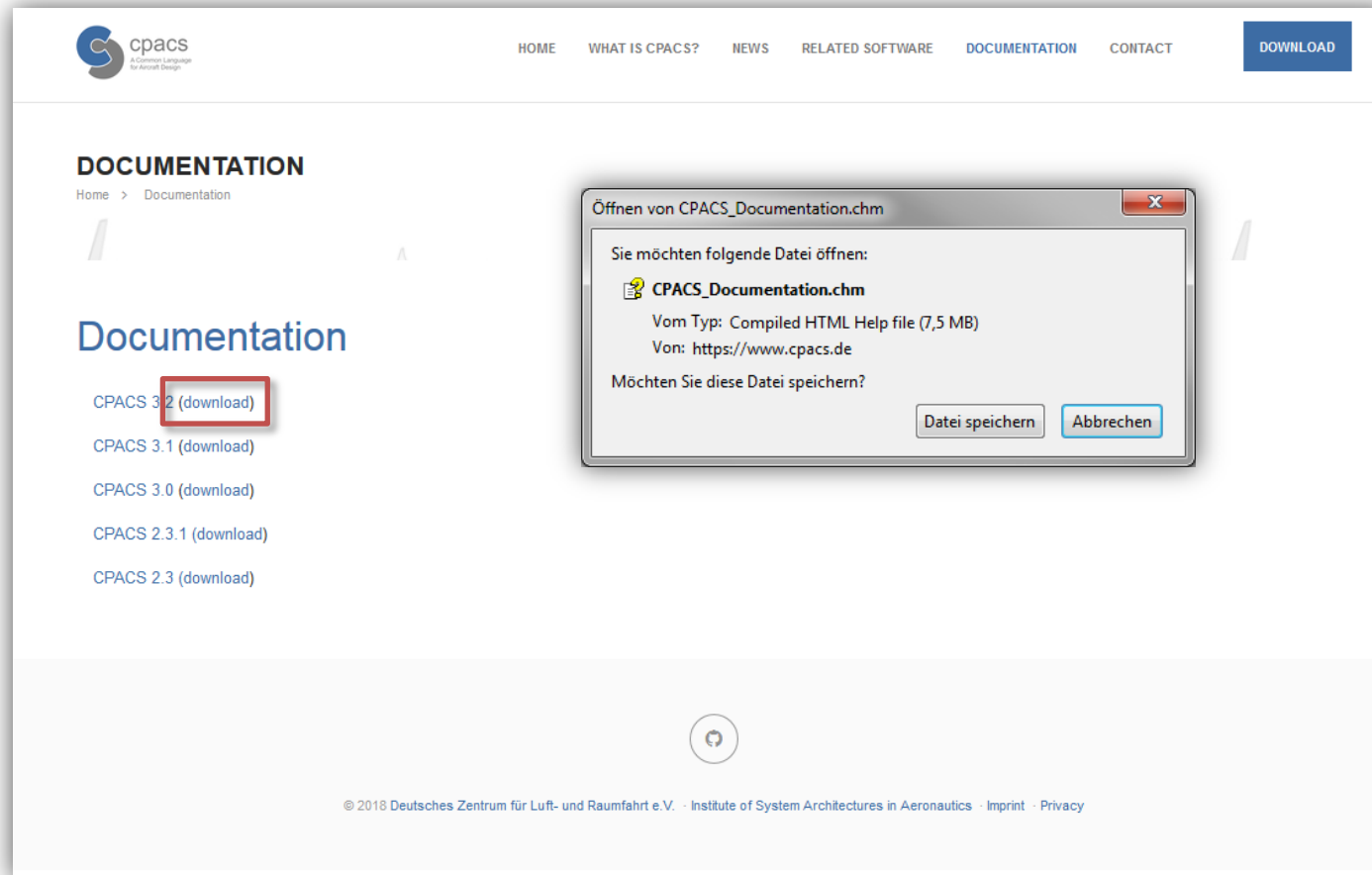
▲See Also
 Reference
 vehiclesType



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>

The screenshot shows the CPACS Documentation website. The main content area is titled 'DOCUMENTATION' and 'Documentation'. A sidebar on the right is titled 'cpacs Element' and contains the following information:

CPACS root element
Namespace: Empty
Schema: Empty

▸ 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

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>

Latest release

CPACS 3.2

MarAlder released this on 18 Feb

CPACS 3.2

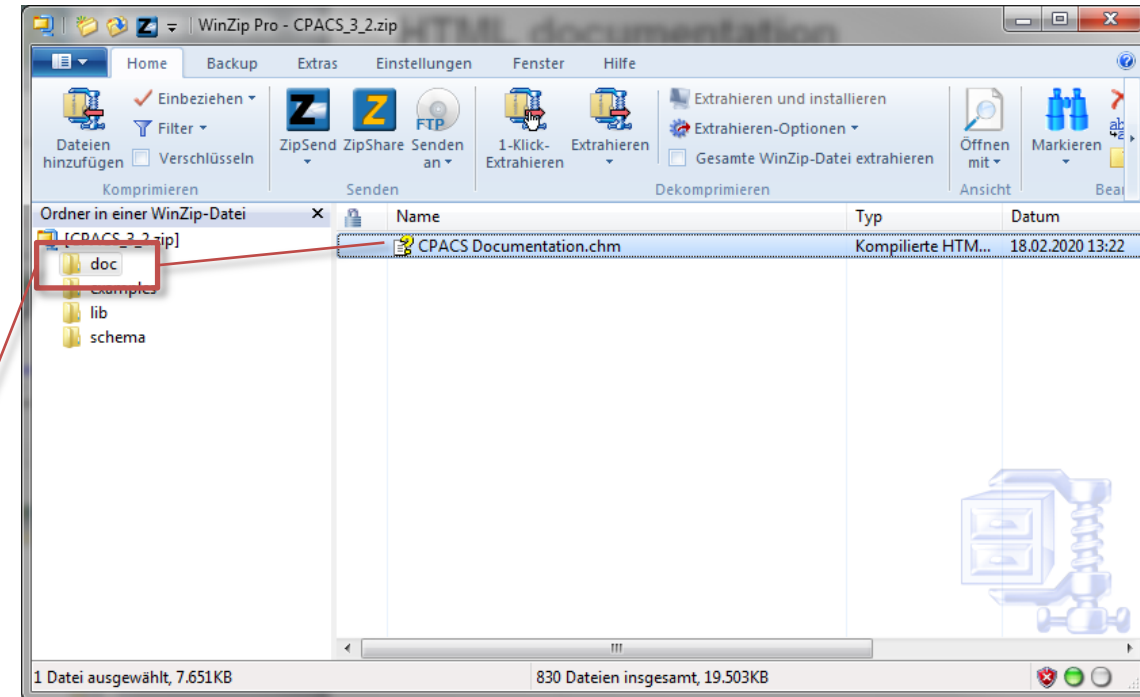
- Replaced tool-specific elements with `xsd:any` element and strict schema request for validation
- UIDs adapted to type `xsd:ID` and `xsd:IDREF`
- UIDs optional for `transformationType` and `pointTypes`
- Replaced `xsd:sequence` elements with `xsd:all` elements where possible
- `cpacsVersion` element set to optional
- `GuideCurves` are now optional for `nacelleCowlType`
- Documentation adaption

All issues for this release can be found online at:

- [CPACS 3.2 Milestone list](#)

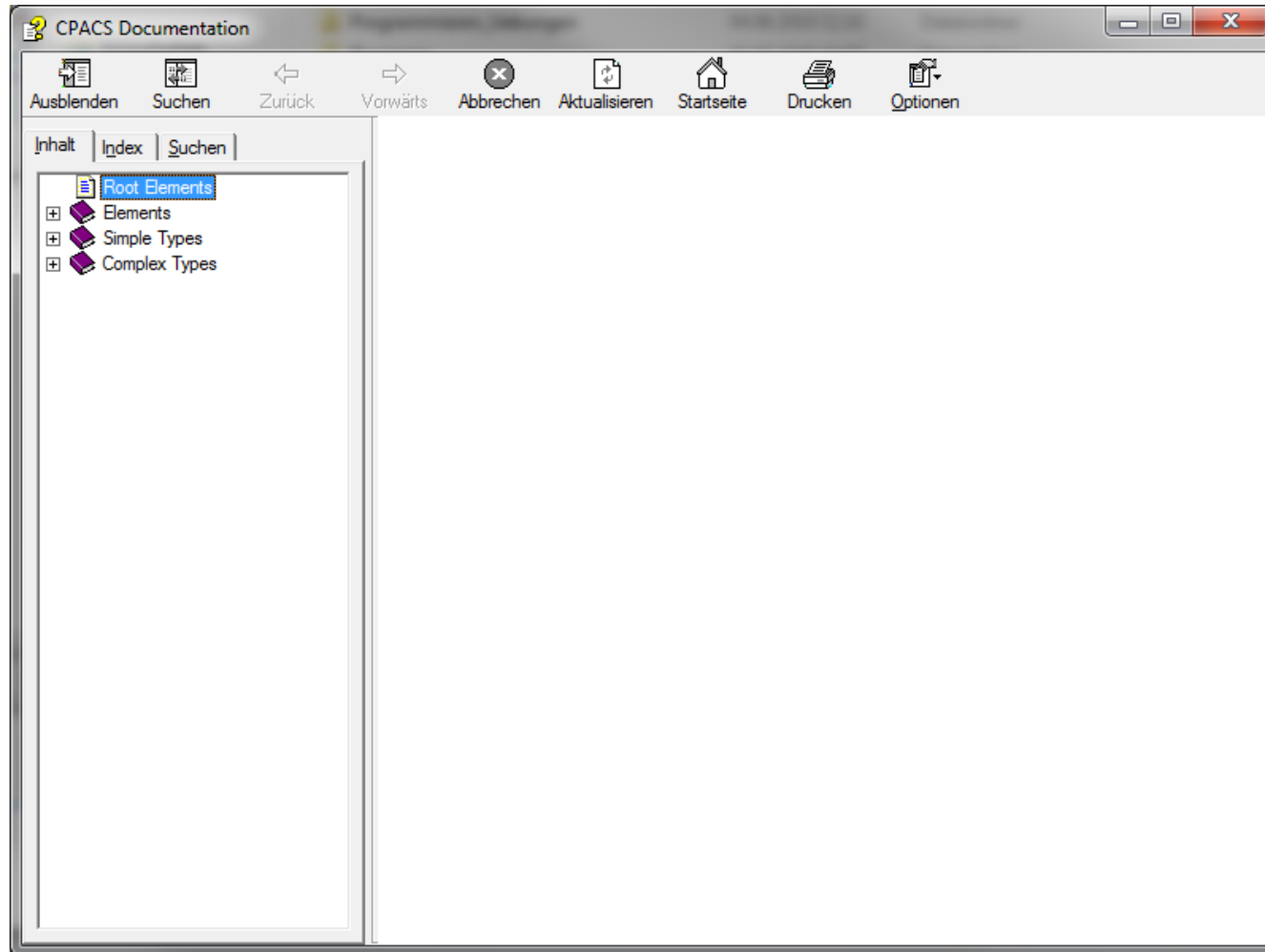
Assets 3

- CPACS_3.2.zip 8.83 MB
- Source code (zip)
- Source code (tar.gz)



HTML documentation

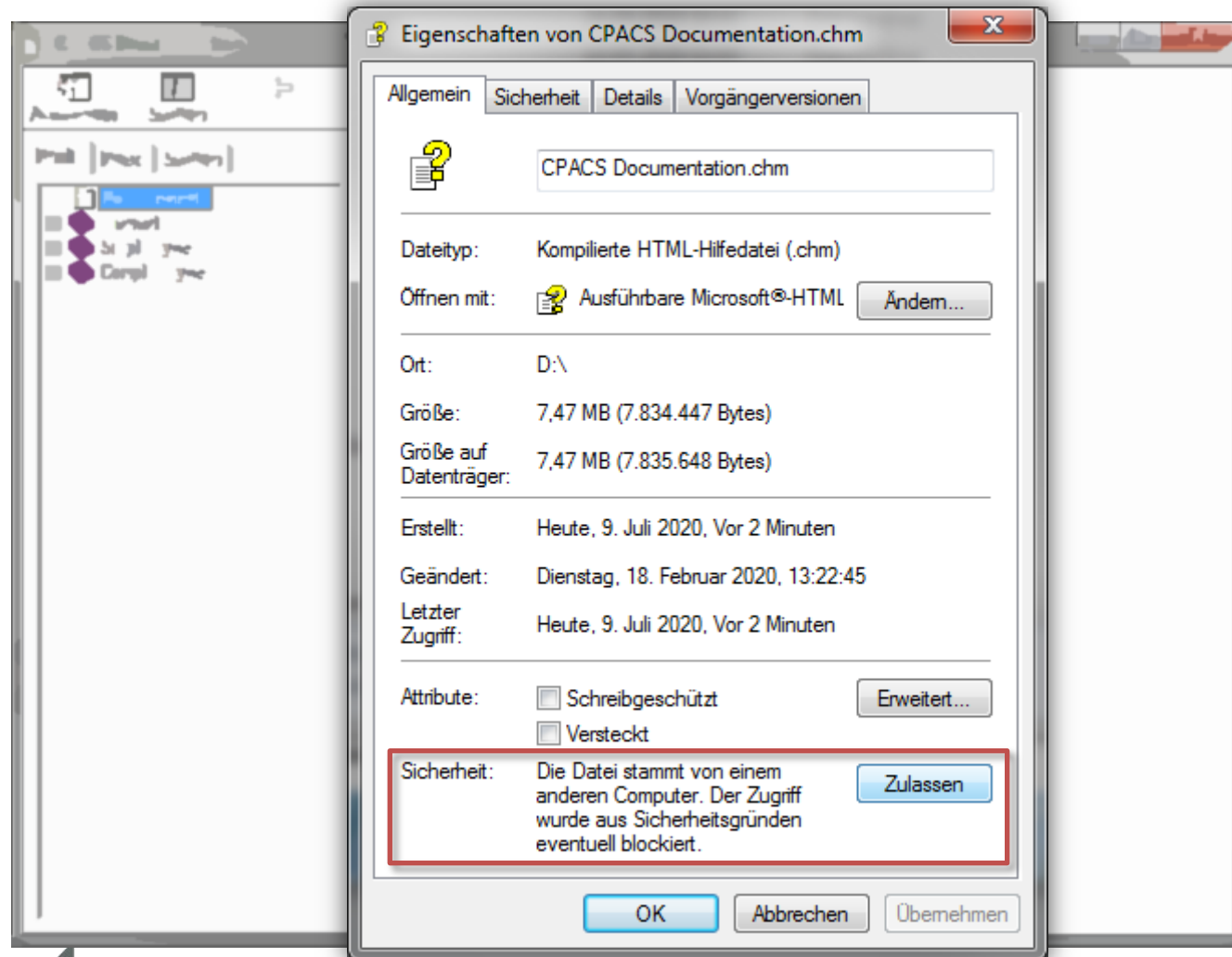
How to get the documentation?



- 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

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

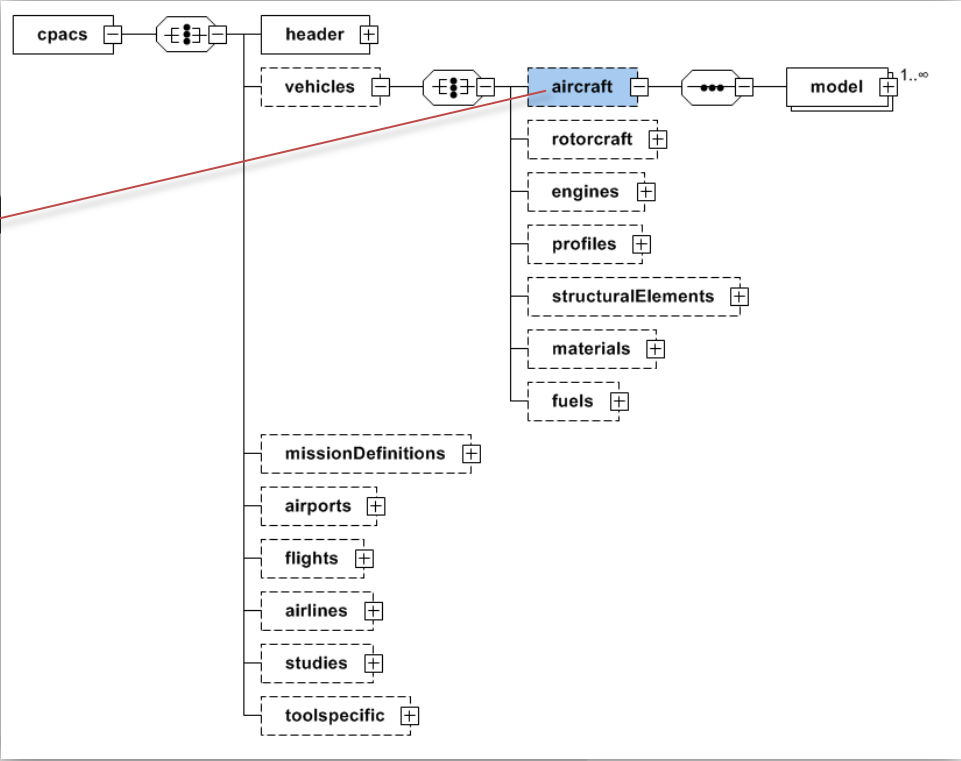
Name	Type	Required	Description
externalDataDirectory	string		
externalDataNodePath	string		
externalFileName	string		

Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
vehiclesType



HTML 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

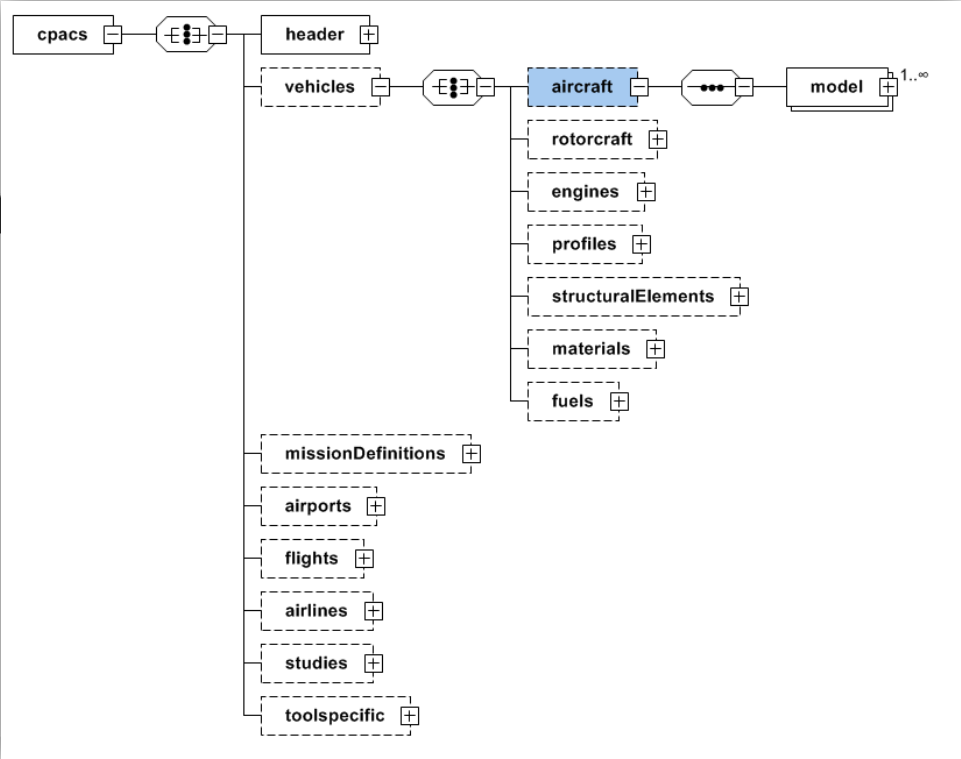
Name	Type	Required	Description
externalDataDirectory	string		
externalDataNodePath	string		
externalFileName	string		

Remarks

Aircraft type, containing all the aircraft models

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HTML documentation

CPACS Documentation

aircraft Element

aircraftType

Namespace: Empty

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Type

aircraftType

Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

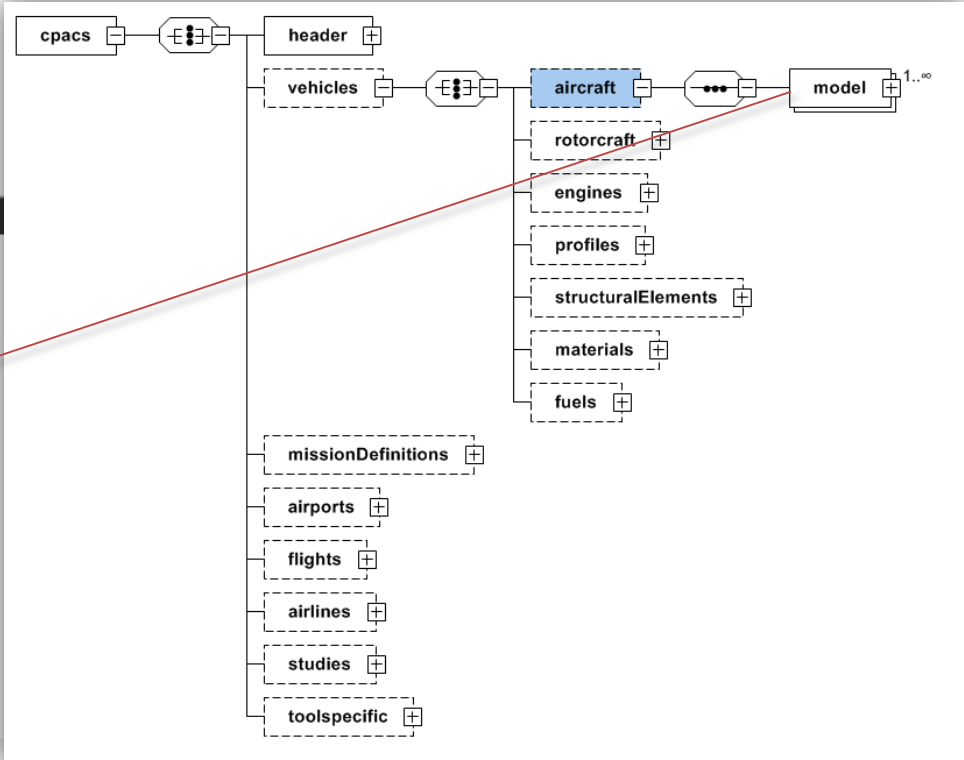
Name	Type	Required	Description
@ externalDataDirectory	string		
@ externalDataNodePath	string		
@ externalFileName	string		

Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
vehiclesType



child element

HTML documentation

CPACS Documentation

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

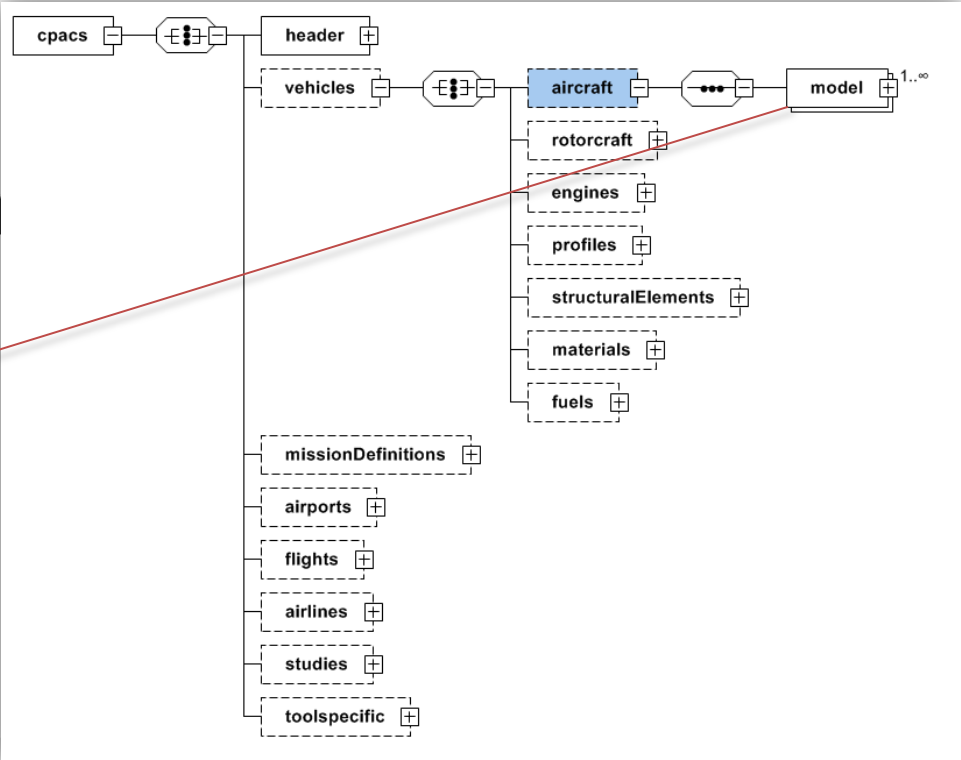
Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

occurene of the child element



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

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

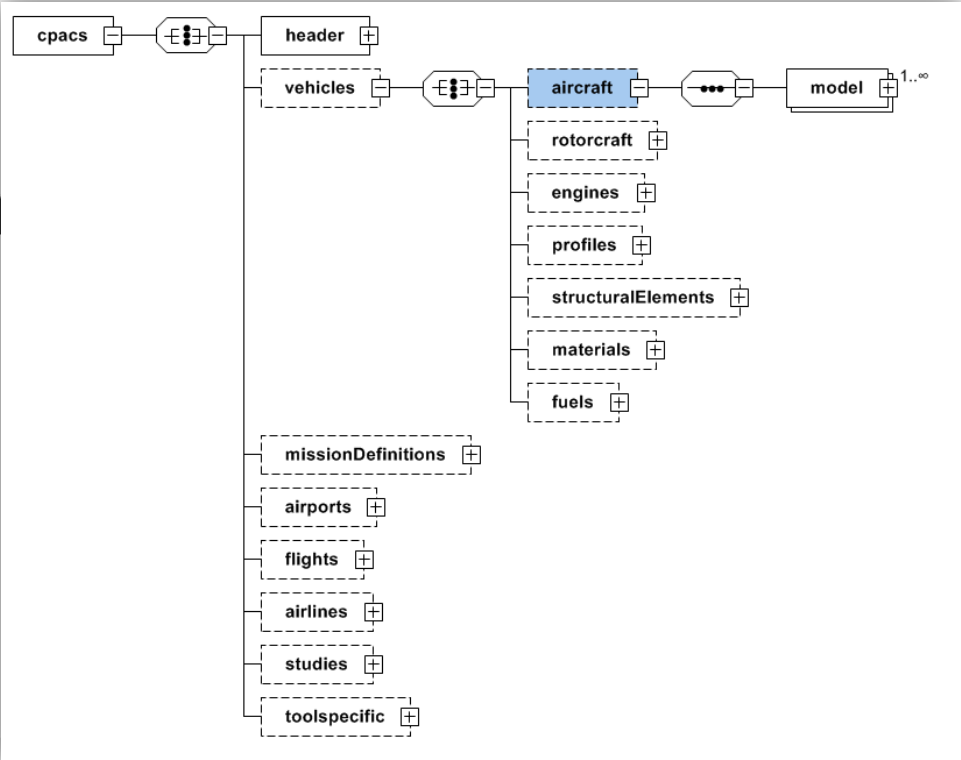
Name	Type	Required	Description
externalDataDirectory	string		
externalDataNodePath	string		
externalFileName	string		

Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
vehiclesType



short description of the element
(sometimes just contains the type's name)



HTML documentation

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

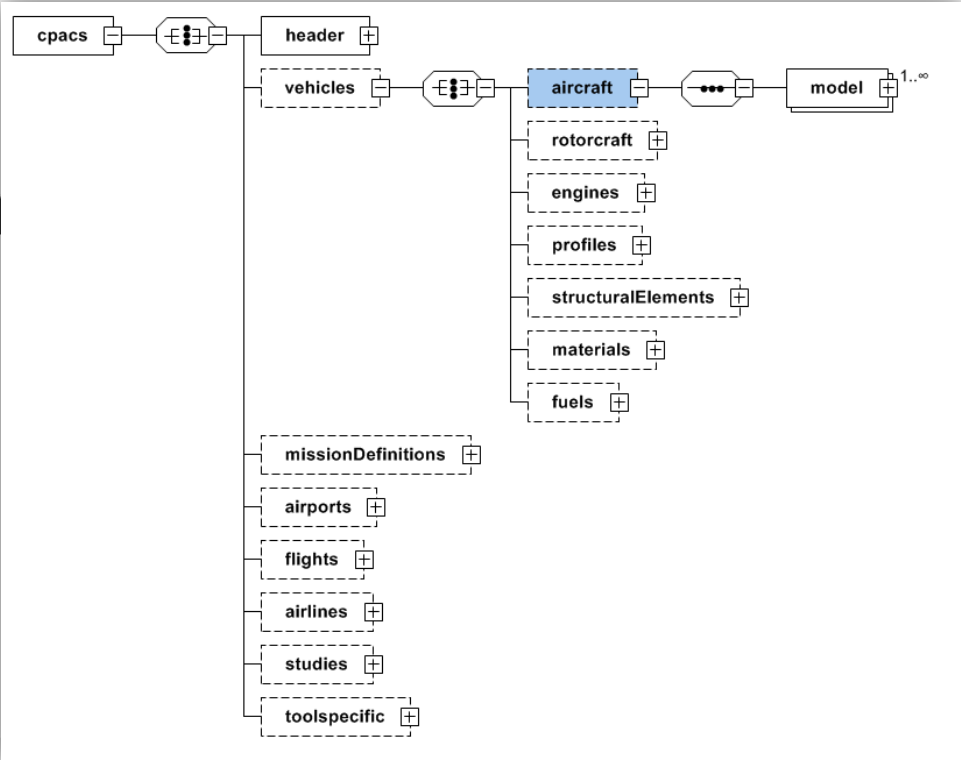
Name	Type	Required	Description
@ externalDataDirectory	string		
@ externalDataNodePath	string		
@ externalFileName	string		

Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
[vehiclesType](#)



list of available attributes

HTML documentation

aircraft Element

aircraftType

Namespace: Empty

Schema: Empty

Type

aircraftType

Parents

vehicles vehiclesType

Children

Name	Occurrences	Description
model	[1, *]	aircraftModelType

Attributes

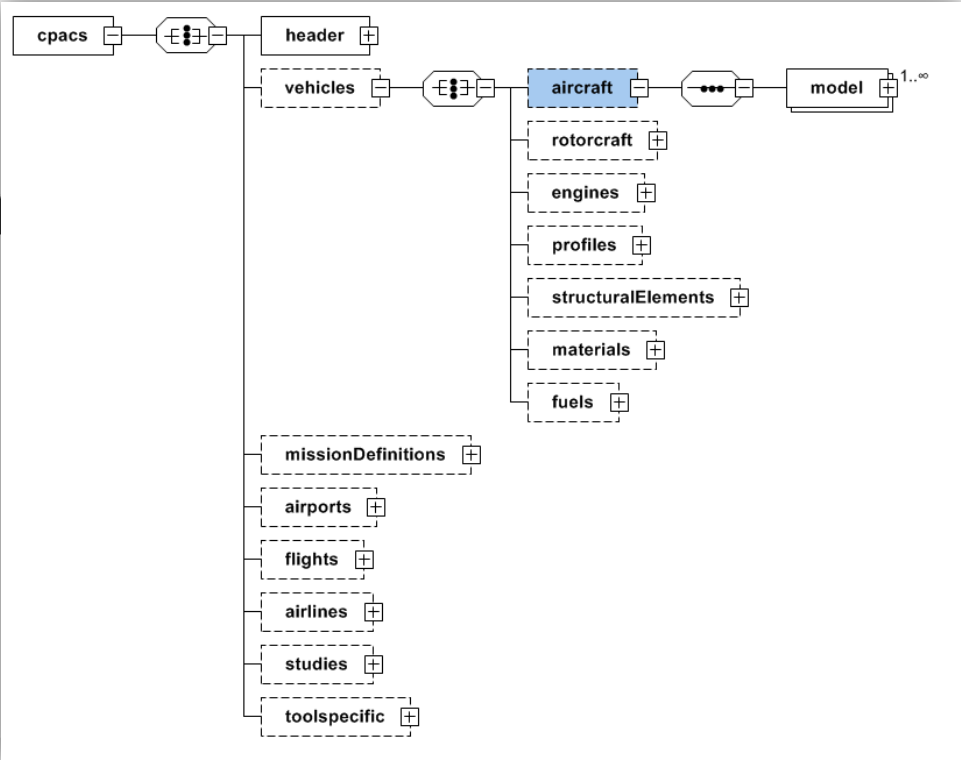
Name	Type	Required	Description
@ externalDataDirectory	string		
@ externalDataNodePath	string		
@ externalFileName	string		

Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
[vehiclesType](#)



type of the attributes



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		

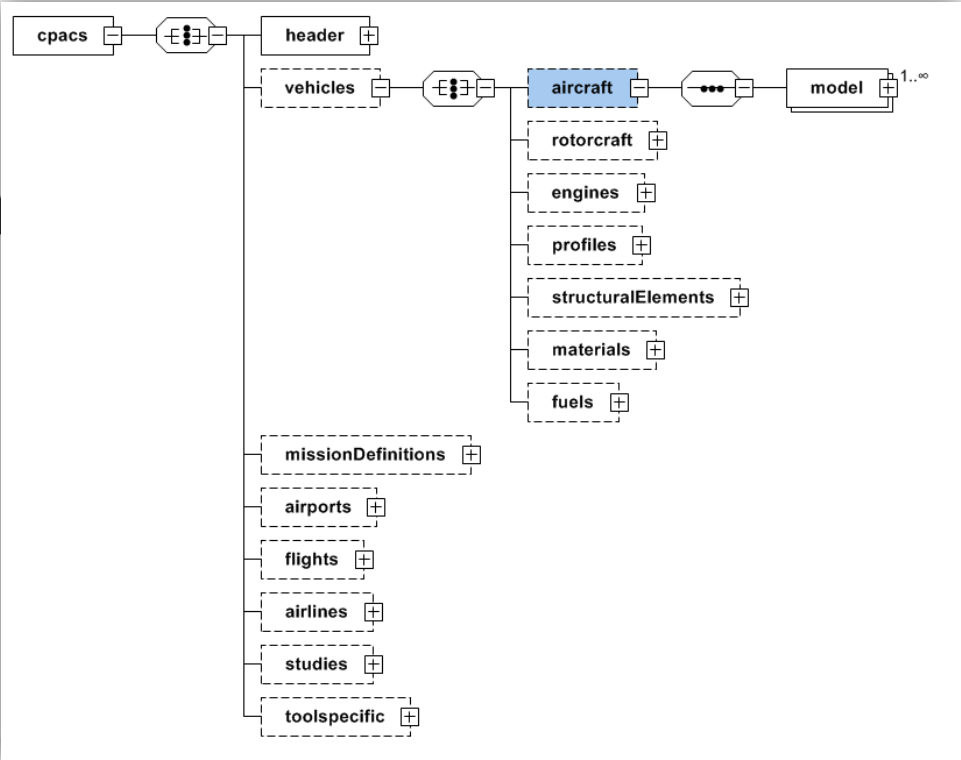
Remarks

Aircraft type, containing all the aircraft models

See Also

Reference
vehiclesType

occurrence of the attributes
empty = optional
“Yes” = required



HTML documentation

CPACS Documentation

cpacs Element










CPACS root element

Namespace: Empty**Schema:** Empty

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

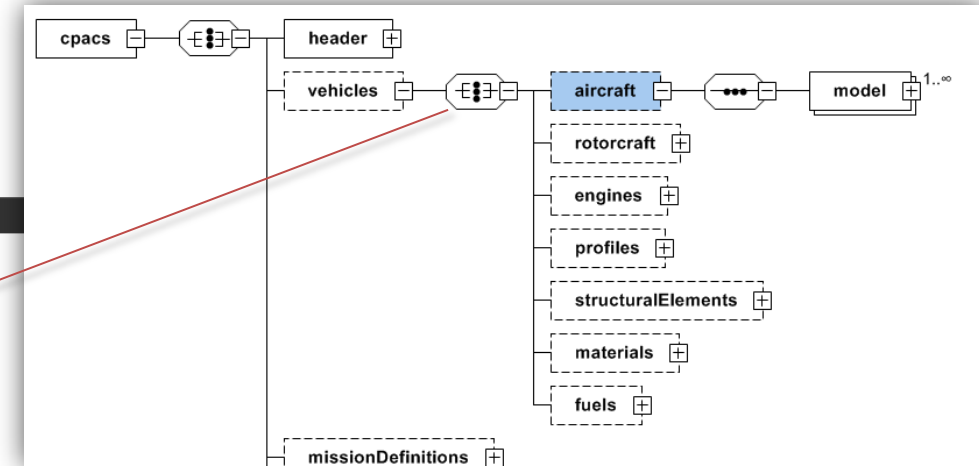
Remarks

Version

V3.2

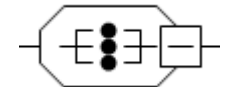
Date

2020-02-18



order of appearance

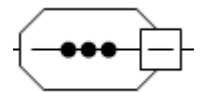
- Sequence is arbitrary (i.e. it does not matter whether *aircraft* is specified first and then *engines* or vice versa)

 All


- Sequence must correspond to the representation in the XSD diagram



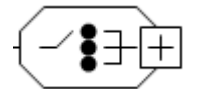
Sequence



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






Choice



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 