APS JSON Library

User Guide

Version: 1.0.0

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1 APSJSONLib

This is a library (exports all its packages and provides no service) for reading and writing JSON. It can also write a JavaBean object as JSON and take a JSON value or inputstream containing JSON and produce a JavaBean.

This basically provides a class representing each JSON type: JSONObject, JSONString, JSONNumber, JSONBoolean, JSONArray, JSONNull, and a JSONValue class that is the common base class for all the other. Each class knows how to read and write the JSON type it represents. Then there is a JavaToJSON and a JSONToJava class with static methods for converting back and forth. This mapping is very primitive. There has to be one to one between the JSON and the Java objects.

1.1 Changes

1.1.1 0.10.0

readJSON(...) in the **JSONValue** base class now throws JSONEOFException (extends IOException) on EOF. The reason for this is that internally it reads characters which cannot return -1 or any non JSON data valid char to represent EOF. Yes, it would be possible to replace *char* with *Character*, but that will have a greater effect on existing code using this lib. If an JSONEOFException comes and is not handled it is still very much more clear what happened than a NullPointerException would be!

1.2 APIs

Complete javadocs can be found at http://apidoc.natusoft.se/APSJSONLib/.

public *class* **JSON** [se.natusoft.osgi.aps.json] {

This is the official API for reading and writing JSON values.

public static JSONValue read(InputStream jsonIn, JSONErrorHandler errorHandler) throws IOException

Reads any JSON object from the specified *InputStream*.

Returns

A JSONValue subclass. Which depends on what was found on the stream.

Parameters

jsonIn *- The InputStream to read from.*

errorHandler *- An implementation of this interface should be supplied by the user to handle any errors during JSON parsing.*

Throws

IOException *- on any IO failures.*

public static void write(OutputStream jsonOut, JSONValue value) throws IOException

Writes a *JSONValue* to an *OutputStream*. This will write compact output by default.

Parameters

jsonOut - *The OutputStream to write to.*

value - *The value to write.*

Throws

IOException - *on failure.*

public static void write(OutputStream jsonOut, JSONValue value, boolean compact) throws IOException

Writes a *JSONValue* to an *OutputStream*.

Parameters

jsonOut - *The OutputStream to write to.*

value - *The value to write.*

compact - *If true the written JSON is made very compact and hard to read but produce less data.*

Throws

IOException

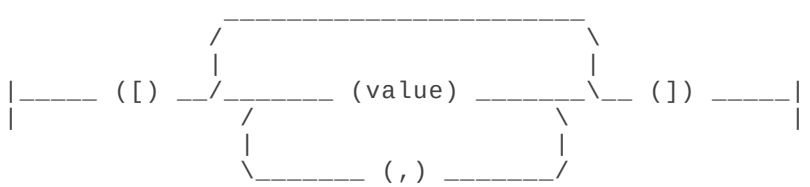
}

---

public *class* **JSONArray** extends JSONValue [se.natusoft.osgi.aps.json] {

This class is based on the structure defined on http://www.json.org/.

This represents the "array" diagram on the above mentioned web page:



@author Tommy Svensson

public JSONArray()

Creates a new JSONArray for wrinting JSON output.

public JSONArray(JSONErrorHandler errorHandler)

Creates a new JSONArray for reading JSON input and writing JSON output.

Parameters

errorHandler

public void addValue(JSONValue value)

Adds a value to the array.

Parameters

value *- The value to add.*

public List<JSONValue> getAsList()

Returns the array values as a List.

public <T extends JSONValue> List<T> getAsList(Class<T> type)

Returns the array values as a list of a specific type.

Returns

A list of specified type if type is the same as in the list.

Parameters

type *- The class of the type to return values as a list of.*

<T> *- One of the JSONValue subclasses.*

}

---

public *class* **JSONBoolean** extends JSONValue [se.natusoft.osgi.aps.json] {

This class is based on the structure defined on http://www.json.org/.

@author Tommy Svensson

public JSONBoolean(boolean value)

Creates a new JSONBoolean instance for writing JSON output.

Parameters

value *- The value for this boolean.*

public JSONBoolean(JSONErrorHandler errorHandler)

Creates a new JSONBoolean instance for reading JSON input or writing JSON output.

Parameters

errorHandler

public void setBooleanValue(boolean value)

Sets the value of this boolean.

Parameters

value *- The value to set.*

public boolean getAsBoolean()

Returns the value of this boolean.

public String toString()

Returns the value of this boolean as a String.

}

---

public *class* **JSONEOFException** extends IOException } [se.natusoft.osgi.aps.json] {

Thrown if a JSON structure is tried to be read from a stream that has no more data.

}

---

public *interface* **JSONErrorHandler** [se.natusoft.osgi.aps.json] {

This is called on warnings or failures.

@author Tommy Svensson

void warning(String message)

Warns about something.

Parameters

message *- The warning message.*

void fail(String message, Throwable cause) throws RuntimeException

Indicate failure.

Parameters

message *- The failure message.*

cause *- The cause of the failure. Can be null!*

Throws

RuntimeException *- This method must throw a RuntimeException.*

}

public *class* **JSONNull** extends JSONValue [se.natusoft.osgi.aps.json] {

This class is based on the structure defined on http://www.json.org/.

@author Tommy Svensson

public JSONNull()

Creates a new JSONNull instance for writing JSON output.

public JSONNull(JSONErrorHandler errorHandler)

Creates a new JSONNull instance for reading JSON input or writing JSON output.

Parameters

errorHandler

public String toString()

Returns

as String.

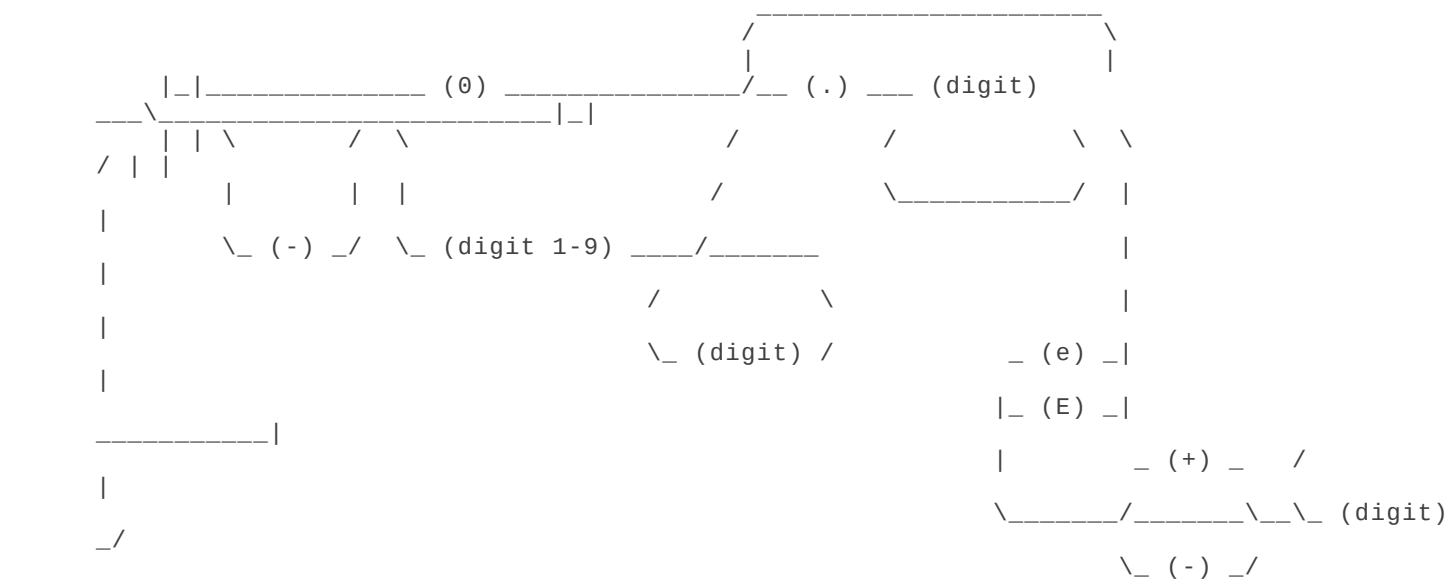
}

---

public *class* **JSONNumber** extends JSONValue [se.natusoft.osgi.aps.json] {

This class is based on the structure defined on http://www.json.org/.

This represents the "number" diagram on the above mentioned web page:



@author Tommy Svesson

public JSONNumber(Number value)

Creates a new JSONNumber instance for writing JSON output.

Parameters

value *- The numeric value.*

public JSONNumber(JSONErrorHandler errorHandler)

Creates a new JSONNumber instance for reading JSON input or writing JSON output.

Parameters

errorHandler *- The error handle to use.*

public Number toNumber()

Returns the number as a Number.

public double toDouble()

Returns the number as a double value.

public float toFloat()

Returns the number as a float value.

public int toInt()

Returns the number as an int value.

public long toLong()

Returns the number as a long value.

public short toShort()

Returns the number as a short value.

public byte toByte()

Returns the number as a byte value.

public String toString()

Returns

number as String.

public Object to(Class type)

Returns the number as a value of the type specified by the type parameter.

Parameters

type - *The type of the returned number.*

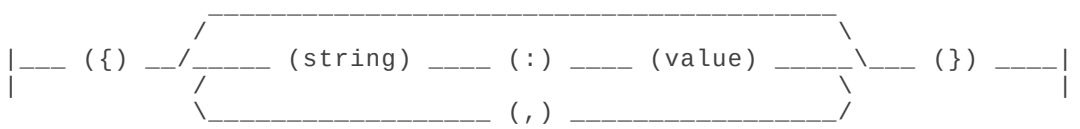
}

---

public *class* **JSONObject** extends JSONValue [se.natusoft.osgi.aps.json] {

This class is based on the structure defined on http://www.json.org/.

It represents the "object" diagram on the above mentioned web page:



This is also the starting point.

To write JSON, create a new *JSONObject* (`new JSONObject()`) and call `addProperty(name, value)` for children. Then do jsonObj.writeJSON(outputStream).

To read JSON, create a new *JSONObject* (`new JSONObject(jsonErrorHandler)`) and then do `jsonObj.readJSON(inputStream)`. Then use `getProperty(name)` to extract children.

@author Tommy Svensson

public JSONObject()

Creates a JSONObject instance for writing JSON output.

public JSONObject(JSONErrorHandler errorHandler)

Creates a new JSONObject instance for reading JSON input or writing JSON output.

Parameters

errorHandler

public Set<JSONString> getPropertyNames()

Returns the names of the available properties.

public JSONValue getProperty(JSONString name)

Returns the named property.

Parameters

name - *The name of the property to get.*

public JSONValue getProperty(String name)

Returns the named property.

Parameters

name - *The name of the property to get.*

public void addProperty(JSONString name, JSONValue value)

Adds a property to this JSONObject instance.

Parameters

name - *The name of the property.*

value - *The property value.*

public void addProperty(String name, JSONValue value)

Adds a property to this JSONObject instance.

Parameters

name - *The name of the property.*

value - *The property value.*

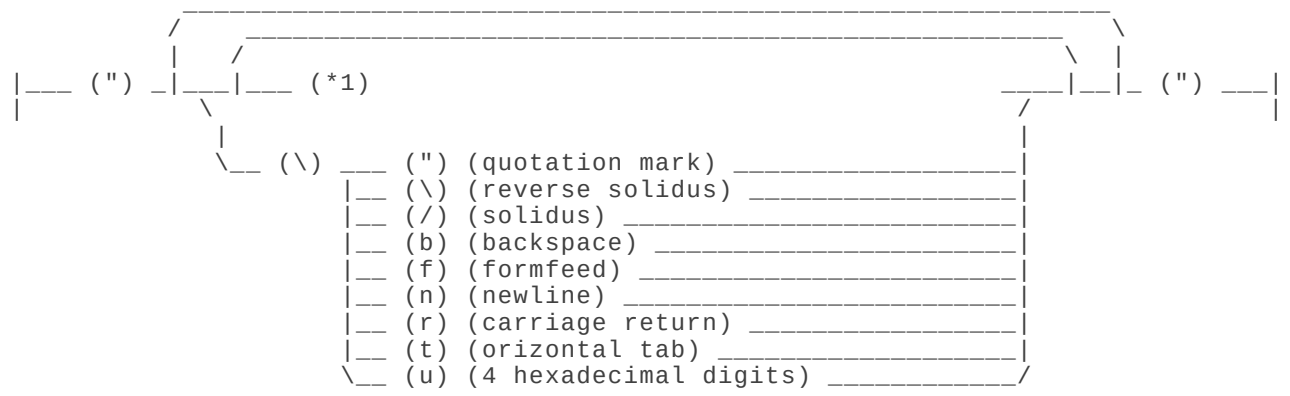
}

---

public *class* **JSONString** extends JSONValue [se.natusoft.osgi.aps.json] {

This class is based on the structure defined on http://www.json.org/.

This represents the "string" diagram on the above mentioned web page:



*1: Any UNICODE character except " or \ or control character

@author Tommy Svensson

public JSONString(String value)

Creates a new JSONString for writing JSON output.

Parameters

value *- The value of this JSONString.*

public JSONString(JSONErrorHandler errorHandler)

Creates a new JSONString for reading JSON input and writing JSON output.

Parameters

errorHandler

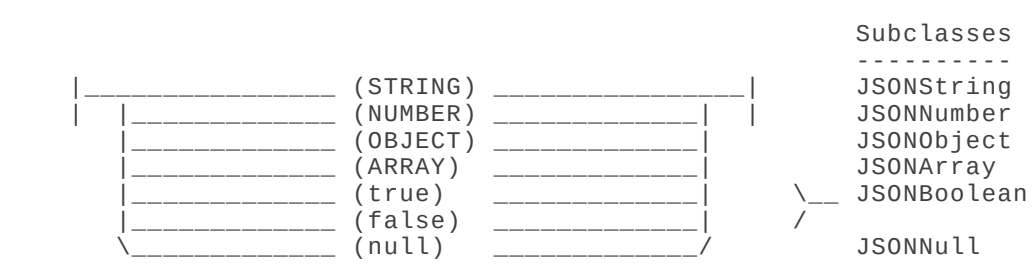
}

---

public *abstract class* **JSONValue** [se.natusoft.osgi.aps.json] {

This class is based on the structure defined on http://www.json.org/.

This is a base class for all other JSON* classes. It represents the "value" diagram on the above mentioned web page:



@author Tommy Svensson

protected JSONValue()

Creates a new JSONValue.

protected JSONValue(JSONErrorHandler errorHandler)

Creates a new JSONValue

protected abstract void readJSON(char c, JSONReader reader) throws IOException

This will read the vale from an input stream.

Returns

the last character read.

Parameters

c - *The first character already read from the input stream.*

reader - *The reader to read from.*

Throws

IOException - *on IO failure.*

protected abstract void writeJSON(JSONWriter writer, boolean compact) throws IOException

This will write the data held by this JSON value in JSON format on the specified stream.

Parameters

writer - *A JSONWriter instance to write with.*

compact - *If true write the JSON as compact as possible. false means readable, indented.*

Throws

IOException - *On IO failure.*

protected JSONErrorHandler getErrorHandler()

Returns

The user supplied error handler.

protected void warn(String message)

Provide a warning.

Parameters

message - *The warning message.*

protected void fail(String message, Throwable cause)

Fails the job.

Parameters

message - *The failure message.*

cause - *An eventual cause of the failure. Can be null.*

protected void fail(String message)

Fails the job.

Parameters

message - *The failure message.*

public void readJSON(InputStream is) throws IOException

This will read the value from an input stream.

Parameters

is - *The input stream to read from.*

Throws

IOException - *on IO failure.*

public void writeJSON(OutputStream os) throws IOException

This writes JSON to the specified OutputStream.

Parameters

os - *The outoutStream to write to.*

Throws

IOException - *on IO failure.*

public void writeJSON(OutputStream os, boolean compact) throws IOException

This writes JSON to the specified OutputStream.

Parameters

os - *The outoutStream to write to.*

compact - *If true write JSON as compact as possible. If false write it readable with indents.*

Throws

IOException - *on IO failure.*

protected JSONReader(PushbackReader reader, JSONErrorHandler errorHandler)

Creates a new JSONReader instance.

Parameters

reader - *The PushbackReader to read from.*

errorHandler - *The handler for errors.*

protected char getChar() throws IOException

Returns the next character on the specified input stream, setting EOF state checkable with isEOF().

Throws

IOException - *on IO problems.*

protected char getChar(boolean handleEscapes) throws IOException

Returns the next character on the specified input stream, setting EOF state checkable with isEOF().

Parameters

handleEscapes - *If true then * escape character are handled.*

Throws

IOException - *on IO problems.*

protected void ungetChar(char c) throws IOException

Unreads the specified character so that the next call to getNextChar() will return it again.

Parameters

c - *The character to unget.*

protected char skipWhitespace(char c) throws IOException

Skips whitespace returning the first non whitespace character. This also sets the EOF flag.

Parameters

c - *The first char already read from the input stream.*

Throws

IOException

protected char skipWhitespace() throws IOException

Skips whitespace returning the first non whitespace character. This also sets the EOF flag.

Throws

IOException

protected char readUntil(String until, char c, StringBuilder sb, boolean handleEscapes) throws IOException

Reads until any of a specified set of characters occur.

Returns

Parameters

until *- The characters to stop reading at. The stopping character will be returned unless EOF.*

c *- The first preread character.*

sb *- If not null read characters are added to this. The stopping character will not be included.*

handleEscapes *- True if we are reading a string that should handle escape characters.*

Throws

IOException

protected char readUntil(String until, StringBuilder sb, boolean string) throws IOException

Reads until any of a specified set of characters occur.

Parameters

until *- The characters to stop reading at. The stopping character will be returned unless EOF.*

sb *- If not null read characters are added to this. The stopping character will not be included.*

string *- True if we are rading a string that should be escaped.*

Throws

IOException

protected char readUntil(String until, StringBuilder sb) throws IOException

Reads until any of a specified set of characters occur.

Parameters

until *- The characters to stop reading at. The stopping character will be returned unless EOF.*

sb *- If not null read characters are added to this. The stopping character will not be included.*

Throws

IOException

protected boolean checkValidChar(char c, String validChars)

Returns true if c is one of the characters in validChars.

Parameters

c - *The character to check.*

validChars - *The valid characters.*

protected void assertChar(char a, char e, String message)

Asserts that char a equals expected char c.

Parameters

a - *The char to assert.*

e - *The expected value.*

message - *Failure message.*

protected void assertChar(char a, String expected, String message)

Asserts that char a equals expected char c.

Parameters

a - *The char to assert.*

expected - *String of valid characters.*

message - *Failure message.*

protected *static class* **JSONWriter** [se.natusoft.osgi.aps.json] {

For subclasses to use in writeJSON(JSONWriter writer).

protected JSONWriter(Writer writer)

Creates a new JSONWriter instance.

Parameters

writer - *The writer to write to.*

protected void write(String json) throws IOException

Writes JSON output.

Parameters

json - *The JSON output to write.*

Throws

IOException - *on IO failure.*

protected void writeln(String json) throws IOException

Writes JSON output plus a newline.

Parameters

json *- The JSON output to write.*

Throws

IOException

}

---

public *class* **BeanInstance** [se.natusoft.osgi.aps.json.tools] {

This wraps a Java Bean instance allowing it to be populated with data using *setProperty(String*, *Object)* methods handling all reflection calls.

public BeanInstance(Object modelInstance)

Creates a new ModelInstance.

Parameters

modelInstance *- The model instance to wrap.*

public Object getModelInstance()

Returns the test model instance held by this object.

public List<String> getSettableProperties()

Returns a list of settable properties.

public List<String> getGettableProperties()

Returns a list of gettable properties.

public void setProperty(String property, Object value) throws JSONConvertionException

Sets a property

Parameters

property *- The name of the property to set.*

value *- The value to set with.*

Throws

JSONConvertionException *- on any failure to set the property.*

public Object getProperty(String property) throws JSONConvertionException

Returns the value of the specified property.

Returns

The property value.

Parameters

property - *The property to return value of.*

Throws

JSONConvertionException - *on failure (probably bad property name!).*

public Class getPropertyType(String property) throws JSONConvertionException

Returns the type of the specified property.

Returns

The class representing the property type.

Parameters

property - *The property to get the type for.*

Throws

JSONConvertionException - *if property does not exist.*

}

---

public *class* **JavaToJSON** [se.natusoft.osgi.aps.json.tools] {

Takes a JavaBean and produces a JSONObject.

public static JSONObject convertObject(Object javaBean) throws JSONConvertionException

Converts a JavaBean object into a *JSONObject*.

Returns

A JSONObject containing all values from the JavaBean.

Parameters

javaBean - *The JavaBean object to convert.*

Throws

JSONConvertionException - on converting failure.

public static JSONObject convertObject(JSONObject jsonObject, Object javaBean) throws JSONConvertionException

Converts a JavaBean object into a *JSONObject*.

Returns

A JSONObject containing all values from the JavaBean.

Parameters

jsonObject - The jsonObject to convert the bean into or null for a new JSONObject.

javaBean - The JavaBean object to convert.

Throws

JSONConvertionException - on converting failure.

public static JSONValue convertValue(Object value)

Converts a value from a java value to a *JSONValue*.

Returns

The converted JSONValue.

Parameters

value - The java value to convert. It can be one of String, Number, Boolean, null, JavaBean, or an array of those.

}

---

public *class* **JSONConvertionException** extends RuntimeException [se.natusoft.osgi.aps.json.tools] {

This exception is thrown on failure to convert from JSON to Java or Java to JSON.

Almost all exceptions within the APS services and libraries extend either *APSException* or *APSRuntimeException*. I decided to just extend RuntimeException here to avoid any other dependencies for this library since it can be useful outside of APS and can be used as any jar if not deployed in OSGi container.

public JSONConvertionException(final String message)

Creates a new *JSONConvertionException*.

Parameters

message - The exception message

public JSONConvertionException(final String message, final Throwable cause)

Creates a new *JSONConvertionException*.

Parameters

message - *The exception message*

cause - *The cause of this exception.*

}

---

public *class* **JSONToJava** [se.natusoft.osgi.aps.json.tools] {

Creates a JavaBean instance and copies data from a JSON value to it.

The following mappings are made in addition to the expected ones:

- *JSONArray* only maps to an array property.
- Date properties in bean are mapped from *JSONString* "yyyy-MM-dd HH:mm:ss".
- Enum properties in bean are mapped from *JSONString* which have to contain enum constant name.

public static <T> T convert(InputStream jsonStream, Class<T> javaClass) throws IOException, JSONConvertionException

Returns an instance of a java class populated with data from a json object value read from a stream.

Returns

A populated instance of javaClass.

Parameters

jsonStream - *The stream to read from.*

javaClass - *The java class to instantiate and populate.*

Throws

IOException - *on IO failures.*

JSONConvertionException - *On JSON to Java failures.*

public static <T> T convert(String json, Class<T> javaClass) throws IOException, JSONConvertionException

Returns an instance of a java class populated with data from a json object value read from a String containing JSON.

Returns

A populated instance of javaClass.

Parameters

json - *The String to read from.*

javaClass *- The java class to instantiate and populate.*

Throws

IOException *- on IO failures.*

JSONConvertionException *- On JSON to Java failures.*

public static <T> T convert(JSONValue json, Class<T> javaClass) throws JSONConvertionException

Returns an instance of java class populated with data from json.

Returns

A converted Java object.

Parameters

json *- The json to convert to java.*

javaClass *- The class of the java object to convert to.*

Throws

JSONConvertionException *- On failure to convert.*

}

---

public *class* **SystemOutErrorHandler** implements JSONErrorHandler [se.natusoft.osgi.aps.json.tools] {

A simple implementation of *JSONErrorHandler* that simply displays messages on System.out and throws a *RuntimeException* on fail. This is used by the tests. In a non test case another implementation is probably preferred.

}
