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MANUAL ON CODES: TABLE-DRIVEN CODE FORMS

New editions of Table-Driven Code Forms

Comments on functionality and structure of referencing externally defined resources (URL) – in general and in case of unstructured mesh for GRIB Edition 3

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**Summary and Purpose of Document**

The structure and the implementation of “URL” (e.g. Template 4.9) are discussed and some suggestions for improvements are made.

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**ACTION PROPOSED**

The TT-GRIB is kindly asked to consider these comments, to review the proposals and accept them for experimental use.

**ANNEXES:**

**DISCUSSIONS**

Last July (IPET-CM I) new template components and templates were proposed for horizontal domain (section 4), vertical domain (section 5) and overlay section (9) introducing the concept of “URL” to store big (meta) data externally.

In principle we agree on the URL usage to remove big data in GRIB messages, provided that the GRIB message behind the URL is NOT needed to identify the coded field.

Nevertheless we see problems in the way it is implemented. Our concerns on practicability and completeness are as follows:

1. structure of URL string

It is not defined, which characters are allowed in the string. Secondly the fragment identifier is missing (e.g. www.dwd.de/grids#grid\_027) which is common for static web pages. Referencing the “Request for Comment” document RFC3986 would be helpful.

1. uniqueness

It is stated that an URI/URL is an unique identifier. This was discussed controversially due to internet host change, server protocol changes etc. Moreover it is not clear, which part of two given URL need to match to call them equal.

To be on the safe side, we propose an additional fingerprint to uniquely identify the (horizontal or vertical) grid or GRIB field.

1. redundant definition of URL in the sections 4, 5, 9

Although the definition of URL is the same for all sections, the template components are named different: 4.14, 5.3, 5.5 and 9.1. This is confusing. It is proposed, to define a general URL template component (may be 99.0) with general code table 99.0. This implicates the implementation of a general section or group “99” which is not part of the GRIB but could be used in all sections.

1. templates only consisting of an URL address are not useful

This is our main object. As already stated, the URL is a pointer to “memory consuming information or data” which should be omitted in GRIB message. For special application the information behind URL is needed and has to be decoded once (!). In operational use the downloading and interpretation of URL is infeasible. A template only providing an URL (web address or file name) does not give the desired information to identify a field. Therefore additional meta data have to be provided for secure identification. There is a trial to define a new template component to overcome this problem in case of horizontal domain.

Additional remarks on new template component for grid identifiers in case of unstructured mesh:

The implementation of new additional meta data is not only necessary when using URL. Also the proposed template components for “unstructured mesh” (TC 4.12) and other components defining explicitly the grid point positions have to be combined with this new “identifier” component. A grid defined by number of grid points (or number of latitudes/longitudes) and latitudes and longitudes values for each grid point need more meta data to be identified correctly. If the number of points is equal, it is hard to check the equality of points as well. This is another reason to propose a new template component with additional identifiers for grids.

1. NetCDF usage

We wish to have NetCDF files in addition to GRIB messages as target of URL.

**PROPOSAL**

**I. General URL definition**

According to above numbering 1./3. and 5. we propose a simple definition of a URL string in form of a new general definition:

New template component for URL:

***TC 99.0 -******General Template Component 99.0 – URL***

|  |  |
| --- | --- |
| **Byte No.** | **Contents** |
| 1-2 | NURL – number of bytes used by URL string |
| 3 – 2+NURL | URL string |

Note:

(1) A URL is a Uniform Resource Locator that is identifying a web resource and is used to locate and retrieve a GRIB message providing the template or the whole GRIB field to be used. NetCDF files (including netCDF-4/HDF5) are possible as well.

The URL string is coded according to International Reference Alphabet (IRA, formerly International Alphabet No. 5 or IA5)

For details on syntax see the “Request For Comment” document [RFC3986](https://tools.ietf.org/html/rfc3986#appendix-B).

(2) This is a general definition to be used in different sections.

If there is still the wish to keep the old definition, the fragment has to be added (all the byte numbers have to be checked):

***Alternative TC 99.0 -******General Template Component 99.0 – URL***

|  |  |
| --- | --- |
| **Byte No.** | **Contents** |
| 1-2 | scheme (code table) |
| 3 | Nhost - number of bytes used by host |
| 4 - 4+Nhost | host |
| 5+Nhost - 6+Nhost | port (unsigned integer) |
| 7+Nhost - 9+Nhost | Npath -number of bytes used by path |
| 10+Nhost - 10+Nhost+Npath | path |
| 11+Nhost+Npath - 13+Nhost+Npath | Nquery -number of bytes used by query |
| 14+Nhost+Npath - 14+Nhost+Npath+Nquery | query |
| 15+Nhost+Npath+Nquery - 17+Nhost+Npath+Nquery | Nfragment - number of bytes used by fragment |
| 18+Nhost+Npath+Nquery - 18+Nhost+Npath+Nquery+ Nfragment | fragment |

The syntax of the URL is:

**Scheme://**[**host**[**:port**]]**/path**[?**query**][#**fragment**]

where port, query and fragment are optional and can be missing.

***Code table 99.0*** – *URL scheme*

***Code figure Meaning***

0 http

1 https

2 ftp

3 file

65535 Missing

If this new general approach with template component 99.0 (and maybe code table 99.0) is accepted, the following template components and code tables have to be deleted:

Template components: 4.14, 5.3, 5.5, 9.1.

Code tables: 4.x, 5.3, 5.x, 9.1.

Additionally in all the templates using the removed template components (4.14, 5.3, 5.5, 9.1) these have to be replaced by TC 99.0. They are not listed here, because they may be subject to other changes (see II. and III.)

**II. New template component for identifiers of horizontal grid**

To overcome the problems shown in discussion points 2./4., the missing meta data are collected in a new template component:

***TC 4.x –Meta data for horizontal domain (Grid identifier in case of explicitly given grid point positions, for use with URL)***

|  |  |
| --- | --- |
| **Byte No**. | **Contents** |
| 1-3 | Number of horizontal grid (defined by originating center, Note 1) |
| 4 | Number of grid in reference (Horizontal staggering, code table 4.x) |
| 5-20 | Fingerprint (unique identifier) |
|  |  |
| Note (1) | Identification of resolution and generating algorithm. |
|  |  |
|  |  |
| ***Code table 4.x*** | ***Number of grid in reference*** |
|  |  |
| **Code** | **Meaning** |
| 0 | reserved |
| 1 | center |
| 2 | vertex |
| 3 | edge midpoint |
| 255 | missing |

**III. Effects of new definitions in I./II.**

All templates using URL definition have to be changed; TC 99.0 replaces all URL template components.

Define new template 4.9:

***NEW: Template 4.9 – URL (including grid identifiers)***

***TC Content***

4.x Meta data for horizontal domain

99.0 Horizontal domain URL

Replace template 4.39 by new one:

***NEW: Template 4.39 – Latitude\_longitude unstructured mesh on ellipsoidal planet simple packing***

***TC Content***

4.0 Ellipsoid of revolution defined with axis length

4.x Meta data for horizontal domain

4.12 Latitude\_longitude unstructured mesh simple packing

**IV. Outlook**

The URL usage in section 5 (vertical domain) has to be handled separately. In this case a new template component with vertical grid identifiers seems to be necessary/helpful as well.