

Description of storage JEVEUX with format HDF

Summary:

One describes here the organization of file HDF adopted to store the contents of a base JEVEUX. This file contains an image of the whole of the objects JEVEUX created on the Total basis at the time of the safeguard and can be used to launch an execution in continuation on the platform of initial execution or any other platform compatible and having the version carried of Code_Aster.

1 General information

By default, the manager of memory JEVEUX employee in *Code_Aster* use several files of direct access of the binary type. These files constitute the “bases” JEVEUX, the structures of data which will again be used in the event of continuation of calculation are stored in the base TOTAL in a format specific to the manager of memory. During calculation, the manager of memory is brought to use the bases to discharge the memory temporarily, thus the access mode chosen for his performances in this mode of use is not adapted to a safeguard especially if he one wants to make them independent of the platform.

The use of bookstore HDF, already used within the framework of the format of data exchange MED, for a writing of the contents of the bases JEVEUX appears much more adapted. The file obtained after safeguard can be easily transferred, after a possible compression, on a local platform to carry out for example operations of postprocessing with a version carried of *Code_Aster*.

A file with format HDF is organized like a tree structure file Unix, the concept of “group” are connected with the concept of repertoire, the concept of “dataset” corresponds to the file. Moreover it is possible to assign attributes to each level of “group” and/or to each “dataset”. We exploited these some concepts to organize the recopy of the whole of the objects JEVEUX contained in a base.

HDF provides a utility (h5dump) making it possible to write with the ASCII format the contents of a whole file, it is thus very easy, for files of reasonable size, to obtain the contents of all the objects constituting a base JEVEUX.

2 Writing of the simple objects JEVEUX

Simple objects JEVEUX are in general of homogeneous type, they are stored in a “dataset” being called after the simple object on the level of the “group”/. The simple objects of repertoire kind of names contain at the same time a table of h-coding of the type INTEGER and lists it stored names of type CHARACTER and must be treated except for. They are divided to store two “datasets” of respective names T_HCOD and T_NOM on the level of a group being called after the simple object on the level of the “group”/.

A named list is associated 'ATTRIBUTES JEVEUX' of 5 attributes to all “datasets” associated with the simple objects and all the groups associated with the repertoires with names containing respectively:

- 1) a text ('SIMPLE OBJECT'),
- 2) an identifier (identifying of simple object JEVEUX),
- 3) a chain containing the class, the kind and the type with the direction JEVEUX (argument of JECREO),
- 4) associated the Fortan type,
- 5) a null string

The systems objects JEVEUX all information of type attribute contains JEVEUX and allow to rebuild the structure of associated data. They do not differ from the simple objects JEVEUX , accessible to the user, that by their name, they are treated in the same way. The systems objects are of homogeneous type and thus do not pose a particular problem of storage. Each object is stored JEVEUX in a “dataset” being called after the system object on the level of the “group”/.

A named list is associated 'ATTRIBUTES JEVEUX' of 5 attributes to all “datasets” associated with the system objects containing respectively:

- 1) a text ('SYSTEM OBJECT'),
- 2) an identifier (identifying of simple object JEVEUX),
- 3) a chain containing the class, the kind and the type with the direction JEVEUX,
- 4) associated the Fortan type,
- 5) a null string

The attributes associated with the “dataset” or the “groups” will be used during the second reading of file HDF to rebuild the structures of data associated with the objects JEVEUX.

3 Writing of the collections JEVEUX

3.1 Contiguous collections

The contiguous collections are built starting from simple objects, it is thus easy to use the methods associated with the simple objects to store these last. The objects of contiguous collection are stored in the segment of values associated with the system object `$$DESO`.

The object simple descriptor of collection is stored in a "dataset" being called after the collection under "group".

A named list is associated 'ATTRIBUTES JEVEUX' of 5 attributes to the associated "dataset" containing respectively:

- 1) a text ('COLLECTION'),
- 2) an identifier (identifying of simple object JEVEUX),
- 3) a chain containing the class, the kind (X) and the type with the direction JEVEUX (I),
- 4) associated the Fortan type,
- 5) a null string.

The system objects of collection are stored in "datasets" being called after each object system of collection under the "group".

A named list is associated 'ATTRIBUTES JEVEUX' of 5 attributes to the associated "dataset" containing respectively:

- 1) a text ('OBJ. SYSTEM COLLECTION'),
- 2) an identifier (identifying of simple object JEVEUX),
- 3) a chain containing the class, the kind and the type with the direction JEVEUX,
- 4) associated the Fortan type,
- 5) a null string.

3.2 Dispersed collections

The dispersed collections are built starting from simple objects for the systems objects of collection and segment of values associated with each object with collection. The systems objects are stored in the same way that for the collection contiguous. The system object `$$DESO` is particular because it is not associated in the case as of collections dispersed with a segment of values, there is not thus an associated "dataset", and it is only by charging the contents with the systèmes objects JEVEUX that the dispersed collection is rebuilt during the second reading of file HDF.

One "group" being called after the collection supplemented by `__OBJETS` is created on the level of "group" to write the objects of dispersed collection. A named list is associated 'ATTRIBUTES JEVEUX' of 5 attributes to the "group", only the first element is nonempty and contains a text (COLLECTION).

Each object of collection is then written in a "dataset" being called after the collection supplemented by the number of the object of collection (including for the named collections) under the "group" describes above.

A named list is associated 'ATTRIBUTES JEVEUX' of 5 attributes to the associated "dataset" containing respectively:

- 1) a text (OBJECT OF COLLECTION),
- 2) the name or the number of the object of collection and the identifier of collection,
- 3) a chain containing the class, the kind and the type with the direction JEVEUX,
- 4) associated the Fortan type,
- 5) a null string.

4 Heading of the file

A named list is stored 'TOTAL BASE JEVEUX' of 5 attributes associated with the "group "/"containing respectively:

- 1) a text identifying the version of *Code_Aster* used to build the file,
- 2) the name of the waiter of calculation used,
- 3) the name of the system on the waiter,
- 4) the date of execution of the code,
- 5) 3 characteristics machine (length out of bits of the standard entirety, length in bytes of the standard entirety, length in bytes of the unit of addressing).

The first information is used during the second reading for if required emitting an alarm when the version of *Code_Aster* used differs. Certain structures of data or catalogues can appear incompatible.

5 Example of file

Here an example of file HDF obtained starting from the carrying out of the test TTLL01A and from which the ASCII representation is resulting from the utility h5dump. One gives only some extracts here illustrating descriptions of the principal objects JEVEUX.

```
HDF5 "resu64.hdf" {
GROUP "/" {
  ATTRIBUTE "BASES TOTAL JEVEUX" {
    DATATYPE H5T_STRING {
      STRSIZE 24;
      STRPAD H5T_STR_SPACEPAD;
      CSET H5T_CSET_ASCII;
      CTYPE H5T_C_S1;
    }
    DATASPACE SIMPLE {(5)/(5)}
    DATED {
      "8/13/2003      7. 1.13", "CLA4ASTR.CLA.EDF      ",
      "OSF1          ", "MA-19-AOUT-2003 10:35: 24",
      "LBIS=64 LOIS= 8 LOUA= 1"
    }
  }
  DATASET "&&SYS .CODE" {
    DATATYPE H5T_STRING {
      STRSIZE 8;
      STRPAD H5T_STR_SPACEPAD;
      CSET H5T_CSET_ASCII;
      CTYPE H5T_C_S1;
    }
    DATASPACE SIMPLE {(3)/(3)}
    DATED {
      "TTLL01A", "      15", "      95"
    }
  }
  ATTRIBUTE "ATTRIBUTES JEVEUX" {
    DATATYPE H5T_STRING {
      STRSIZE 24;
      STRPAD H5T_STR_SPACEPAD;
      CSET H5T_CSET_ASCII;
      CTYPE H5T_C_S1;
    }
  }
}
```

```

    DATASPACE SIMPLE {(5)/(5)}
    DATED {
        "SIMPLE OBJECT          ", "          30",
        "G V K8                  ", " "CHARACTER*8  ",
        "                          "
    }
}
}
...
GROUP "TEMPLE                .DESC" {
    ATTRIBUTE "ATTRIBUTES JEVEUX" {
        DATATYPE H5T_STRING {
            STRSIZE 24;
            STRPAD H5T_STR_SPACEPAD;
            CSET H5T_CSET_ASCII;
            CTYPE H5T_C_S1;
        }
        DATASPACE SIMPLE {(5)/(5)}
        DATED {
            "SIMPLE OBJECT          ", "          287",
            "G NR K16                ", " "CHARACTER*16  ",
            "                          "
        }
    }
    DATASET "T_HCOD" {
        DATATYPE H5T_STD_I64LE
        DATASPACE SIMPLE {(43)/(43)}
        DATED {
            37,344,16,18,18,6,0,0,0,18,8,6,4,0,0,0,7,0,0,0,
            0,13,17,12,0,16,11,2,0,5,0,15,14,1,0,9,0,3,0,10,
            0,0,0
        }
    }
    DATASET "T_NOM" {
        DATATYPE H5T_STRING {
            STRSIZE 16;
            STRPAD H5T_STR_SPACEPAD;
            CSET H5T_CSET_ASCII;
            CTYPE H5T_C_S1;
        }
        DATASPACE SIMPLE {(18)/(18)}
        DATED {
            "TEMP                ", "FLUX_ELGA  ", "FLUX_ELNO  ",
            "FLUX_NOEU          ", "META_ELGA_TEMP ", "META_ELNO  ",
            "META_NOEU          ", "DURT_ELGA_META ", "DURT_ELNO  ",
            "DURT_NOEU          ", "HYDR_ELGA      ", "HYDR_ELNO  ",
            "HYDR_NOEU          ", "DETE_ELNO     ", "DETE_NOEU  ",
            "COMPOTHER          ", "ERTH_ELEM_TEMP ", "ERTH_ELNO_ELEM "
        }
    }
}
}
DATASET "TEMPLE                .INST" {
    DATATYPE H5T_IEEE_F64LE
    DATASPACE SIMPLE {(42)/(42)}
    DATED {
        0,0.0001,0.0002,0.0003,0.0004,0.0005,0.0006,0.0007,0.0008,
        0.0009,0.001,0.002,0.003,0.004,0.005,0.006,0.007,0.008,0.009,
        0.01,0.02,0.1,0.2,0.7,2,1.79769e+308, 1.79769e+308, 1.79769e+308,
    }
}
}
```

Titre : Description du stockage JEVEUX au format HDF
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c6bcbc9cbfa6

```
1.79769e+308, 1.79769e+308, 1.79769e+308, 1.79769e+308, 1.79769e+308,  
1.79769e+308, 1.79769e+308, 1.79769e+308, 1.79769e+308, 1.79769e+308,  
1.79769e+308, 1.79769e+308, 1.79769e+308, 1.79769e+308  
}
```

```
ATTRIBUTE "ATTRIBUTES JEVEUX" {  
  DATATYPE H5T_STRING {  
    STRSIZE 24;  
    STRPAD H5T_STR_SPACEPAD;  
    CSET H5T_CSET_ASCII;  
    CTYPE H5T_C_S1;  
  }  
  DATASPACE SIMPLE {(5)/(5)}  
  DATED {  
    "SIMPLE OBJECT", "293",  
    "G V R", "REAL*8",  
    "  
  }  
}
```

...