Restarting LS-DYNA

- Introduction
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- 3 Types of Restart

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  - Small Restart

  - Full Restart

Restarts

- A "restart" is a continuation of an LS-DYNA run from a particular point in time.

- A restart requires a binary dump file which contains a complete record of the model (stress, strain, deformation, etc) at a particular point in time.
  - Binary dump files are written during an analysis at intervals according to *DATABASE_BINARY_D3DUMP and/or *DATABASE_BINARY_RUNRSF
  - d3dump files accumulate whereas runrsf files overwrite
  - A binary d3dump file is, by default, written at the normal termination of a run
    - "d=nodump" on the execution line prevents output of d3dump
  - The number of runrsf files retained is controlled by the parameter NR in *DATABASE_BINARY_RUNRSF.
    - Default is NR=1
    - If NR is greater than 1, the runrsf files are written in cyclical fashion.

Restarts

- When doing a restart:

    - Use the same LS-DYNA executable as in the run that produced the dump file

    - Use same numbers of CPU's as in the run that produced the dump file

1st Type: Simple Restart

- Restart made from any dump file written prior to termination time.

- Goal is just to continue the analysis without changing anything.

- No input changes are needed (not even termination time) and thus no input file is specified on the execution line.

- Sample execution line:

        lsdyna r=d3dump01

2nd Type: Small Restart

- Only a few specific changes to the model are permitted. Some of the changes allowed in a small restart are:

  - Change termination time
  - Change output intervals
  - Change time step controls
  - Modify load curves (number of data points in curve must not change)
  - Add nodal constraints
  - Delete contacts, parts, elements
  - Switch parts from deformable to rigid, or vice versa

- See the *RESTART section in the User's Manual for the keyword commands permitted in a small restart input deck

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Small Restart

- Need a binary dump file *and* a small input deck
- The input deck might look like this...

```
*KEYWORD
*CONTROL_TERMINATION
15e-03
*DATABASE_BINARY_D3PLOT
1e-5
*DELETE_PART
4,5
*DELETE_CONTACT
3
*END
```

- The execution line...

  lsdyna i=restart-input.k r=d3dump01

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3rd Type: Full Restart

- Changes of a general nature can be made in a full restart, including addition of parts, loads, and contacts.

- A full restart requires a binary dump file and a full restart input deck. In the full restart input deck, a full, keyword description of the model is given.
  - Input for retained nodes, elements, parts, materials, contacts, loads, etc. is copied directly from the original input deck.
  - That input which is copied from the original input deck can be modified as desired.
  - Input for new parts, materials, contacts, loads, etc. is added.

- The command *STRESS_INITIALIZATION must be specified in the full restart input deck for preexisting parts to be initialized.
  - Initializes stress, strain, displacement, etc. for all parts which are carried over or, optionally, for only a subset of those parts.

Full Restart

- Do not change the element connectivity (mesh topology) of retained elements.

- Undeformed coordinates of retained nodes should appear in the *NODE data of the restart input deck. In other words, just use the *NODE data from the original input deck.
  - Coordinates will be initialized according to data saved in dump file

- *DELETE commands are just for small restarts.
  - To eliminate parts and elements in a full restart, omit their *PART and *ELEMENT data, resp., in the full restart deck

- Do not use *INITIAL_VELOCITY for nodes carried over from previous run. Use *CHANGE_VELOCITY_*option* to modify velocities of such nodes.

- Preexisting contacts that are to be retained should include the _ID option so that the contact ID numbers in the original input deck match those in the full restart input deck.
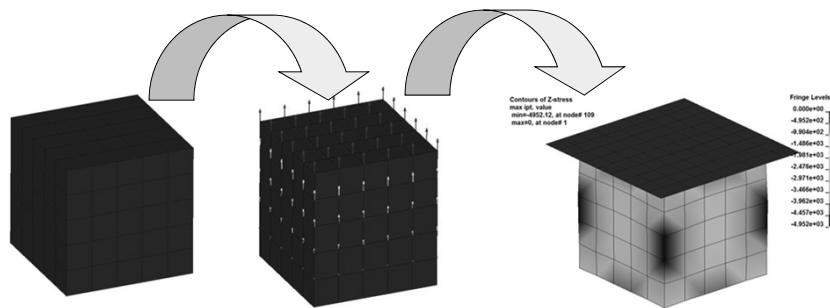
Full Restart

- Binary output from full restarts will blend seamlessly with previous output.

- The binary dump file necessary to submit a full restart when running MPP LS-DYNA is named d3full*xx* (not d3dump*xx*)

  - Use, for example, n=d3full01 on execution line instead of r=d3dump01 when submitting a full restart on MPP LS-DYNA

  - Still use r=d3dump*xx* when submitting a small restart on MPP LS-DYNA.

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Exercise 8

- Try to use a full deck restart.

- Add material and contacts.

- Remove single point constraints.

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