

# Work Smarter with Scripting

Oasys PRIMER, D3PLOT, T/HIS, REPORTER

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# JavaScript

# What is JavaScript?

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- Scripting in Oasys is based around JavaScript
- JavaScript is a programming language, widely used for web programming
- We have extended JavaScript by adding classes and methods for communication with Oasys programs
- The user's scripts can include both Core and Oasys extensions
- The interpreter is included **inside** Oasys – no special software or system setup is required.

# Why write scripts?

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## **Advantages:**

- Time saving (repetitive tasks)
- Eliminate human errors
- Create and customise something that matches your process
- Certain tasks can only be done with scripting
  - User defined checks
  - Etc...

# How to start

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- Look at examples provided
  - Download them from the website, download training course
- Look at the documentation
- Choose an environment
  - Any text editor: Eclipse, Vi, Notepad++, etc.
  - Visual Studio Code, IntelliSense (free to use, supports word based completions)
- Start with a simple task:
  - Create nodes
  - Create shells
  - Etc

# Examples

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- Some advantages of scripting...

# Example 1: User defined checks

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- Customise your checks instead of relying the built-in checks
- Introduce new checks - Company specific checking
- 2 types of user defined checks
  - Item checks
  - Custom checks
- The script needs to be in the PRIMER script directory:
  - `$OA_ADMIN/primer_library/scripts/checks` (if `$OA_ADMIN` is defined)
  - `$OA_INSTALL/primer_library/scripts/checks`
  - `$OA_HOME/primer_library/scripts/checks`

# Example 1: User defined checks

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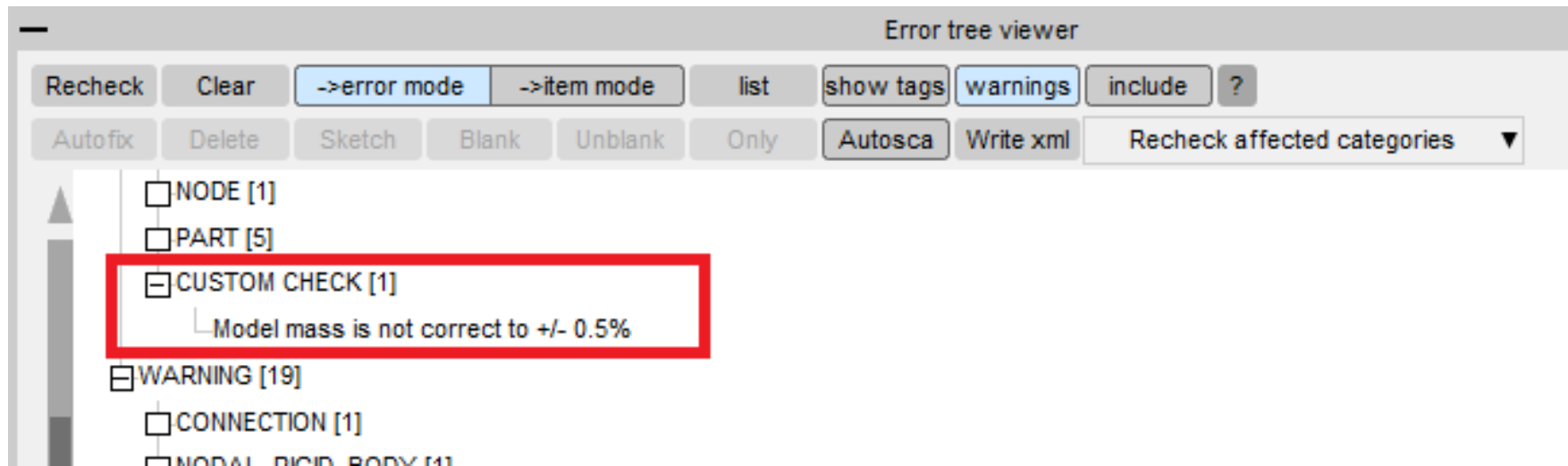
- Check that the mass of the model is 1500kg +/- 0.5%
- A custom check will have 2 arguments passed to it automatically in the arguments array. The first argument is the script name and the second argument is the Model object:

```
// arguments[0] is name of script
var m = arguments[1]; // arguments[1] is model
mass = m.Mass();
if ( Math.abs((mass-1500)/1500) > 0.005)
    Check.Error("Model mass is not correct to +/- 0.5%", "Mass is "+mass+" but should be 1500kg");
```



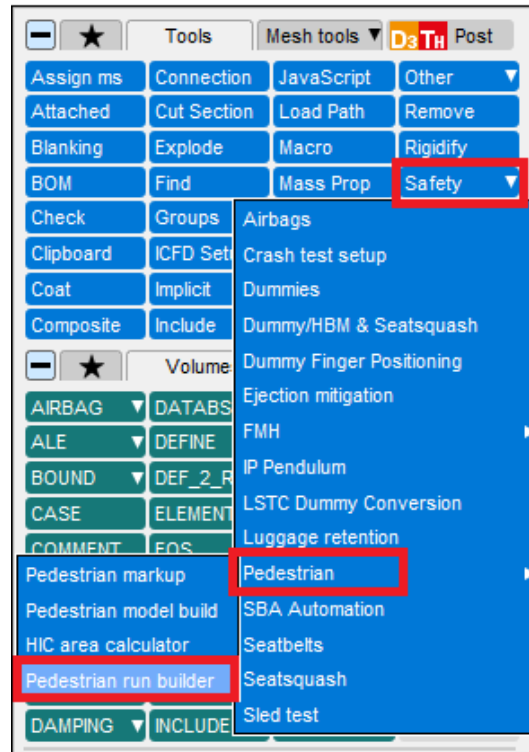
# Example 1: User defined checks

- Outcome when running a model check:



# Example 2: Pedestrian run builder

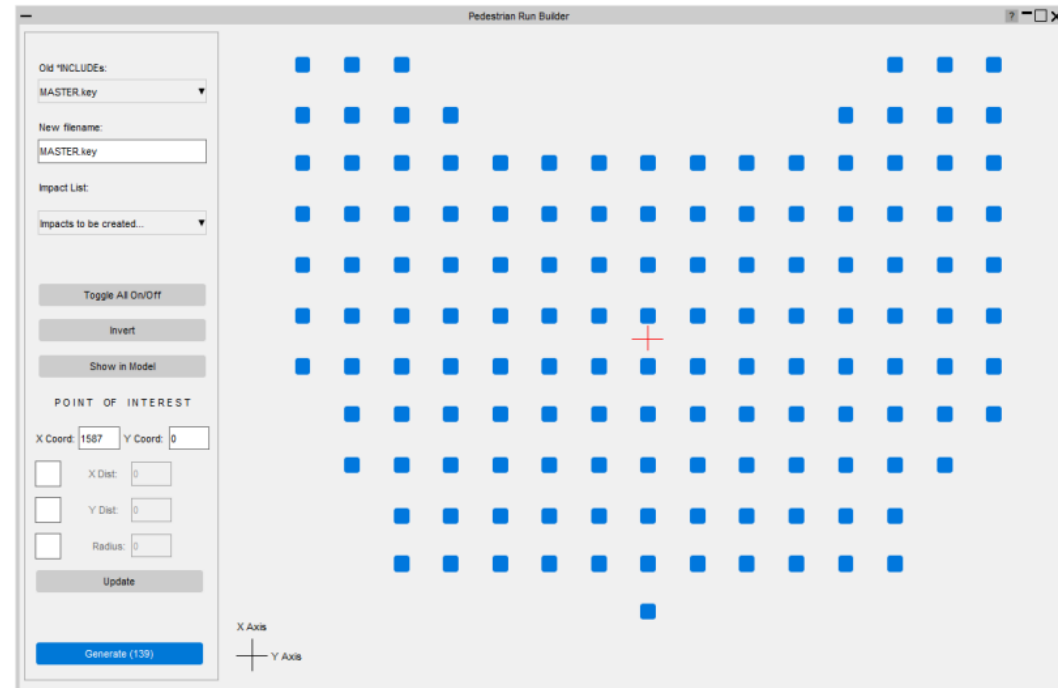
- Example with a Graphical User Interface



- We have 100 analyses where the only difference between them is the point of impact of a pedestrian with the bonnet of a vehicle.
- Then we have change something in the vehicle. For example, the engine, which is in an include file.
- Instead of manually edit the include references in tens of master files, we can use this tool.

## Example 2: Pedestrian run builder

- We read a list file containing a list of all the impact points and original model locations.
- The script has a GUI to select for which points we want to change the include, but we can also select all.
- Select the “old” include to change.
- Type new filename.
- Type new filename.
- Click on “Generate”.
- GUI builder available



# Example 2: Pedestrian run builder

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- Before:

The include filename was engine.key

```
$ =====  
$ INCLUDE cards  
$ =====  
$  
*INCLUDE  
/data3//engine.key  
$  
*INCLUDE  
/data3/control.key
```



- After:

All of the impact points have changed their include filename to engine2.key

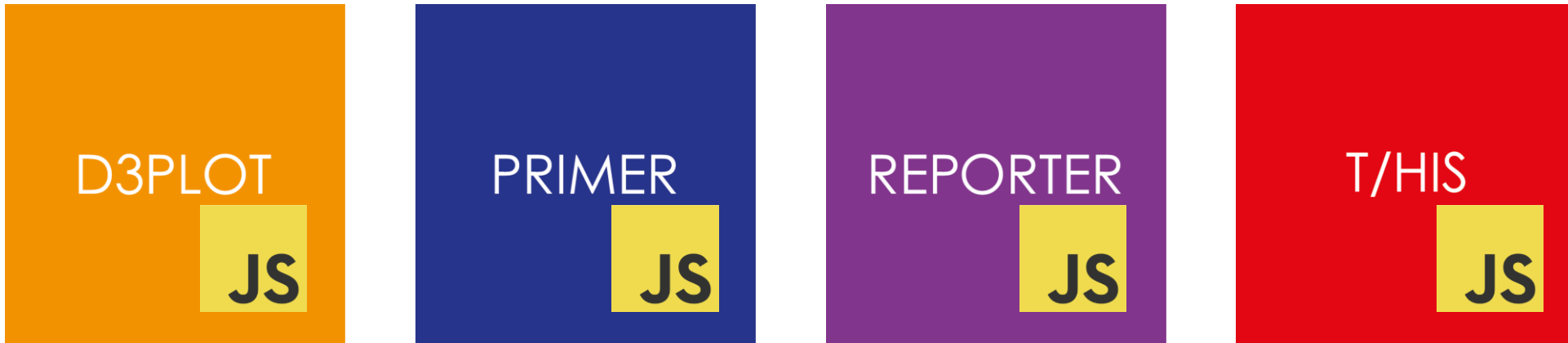
```
$ =====  
$ INCLUDE cards  
$ =====  
$  
*INCLUDE  
/data3//engine2.key  
$  
*INCLUDE  
/data3/control.key  
.
```

Python

# Python

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- The Oasys LS-DYNA environment software uses JavaScript for scripting.

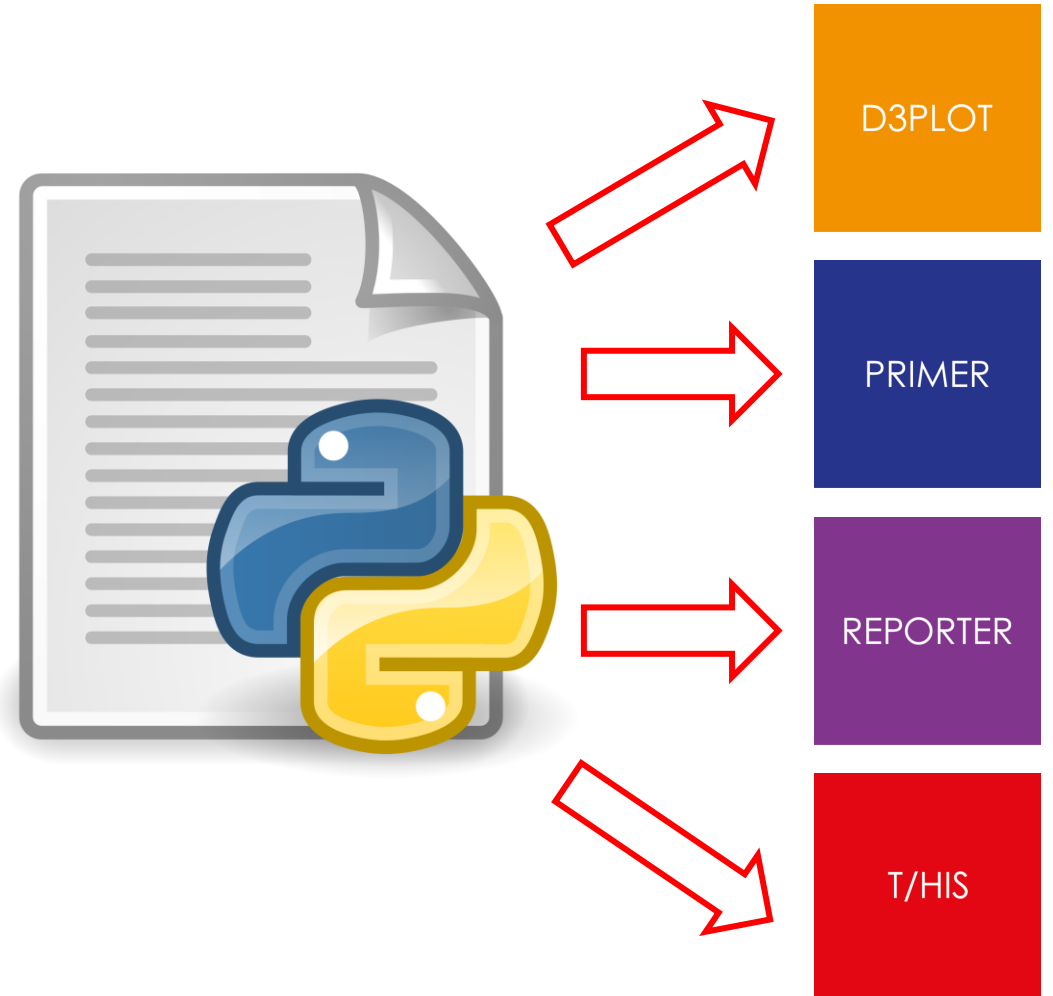


- Each program contains a JavaScript interpreter to allow JavaScript to be used *inside* the program.
- This can be used to extend the programs and automate tasks.
- Very popular and widely used.

# Python

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- Python is a general-purpose programming language that is very popular.
- It has lots of packages to allow it to be used for many tasks such as TensorFlow, NumPy, SciPy, Pandas, ...
- ANSYS are also developing python packages (pyANSYS) to give a pythonic interface to ANSYS software.
- We are developing packages for using the Oasys LS-DYNA software from python



# Example

- When we first added the JS interface (15 years ago!) I gave an example showing how a script could make a model, nodes and shells in PRIMER.
- Our intention is to make a python API as similar as possible to the JS API.
- Python is running *externally* so we need to communicate with the software.
- The same example in python (Demo...)

```
demo_1a.jsjs (C:\work\Python\demo) - GVIM
File Edit Tools Syntax Buffers Window Help
var m = new Model();
Message("Making nodes");
for (y=0; y<11; y++)
{
  for (x=0; x<11; x++)
    var n = new Node(m, 1+x*(y*11), x*10, y*10, 0);
}
Message("Making shells");
for (i=1; i<=10; i++)
{
  for (j=1; j<=10; j++)
    var s = new Shell(m, i+(j*10), i, ((i-1)*11)+j+0, ((i-1)*11)+j+1, ((i-0)*11)+j+1, ((i-0)*11)+j+0);
}
m.UpdateGraphics();
View.Show(View.XY);
View.Ac();
-- INSERT --
1,1 All
```

```
demo_1b.jsjs + (C:\work\Python\demo) - GVIM1
File Edit Tools Syntax Buffers Window Help
var r = 100/(2*Math.PI);
Message("Altering coordinates");
var m = Model.GetFromID(1);
for (i=0; i<11; i++)
{
  for (j=0; j<11; j++)
  {
    var angle = (j/10)*2*Math.PI;
    var n = Node.GetFromID(m, 1+j*(i*11));
    n.x = 50 + Math.cos(angle)*r;
    n.z = r + Math.sin(angle)*r;
  }
}
m.UpdateGraphics();
-- INSERT --
1,1 Top
```



# Feedback

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- Is there anything to do with scripting that you would like us to contact you about?
- Would you like to have updates and/or help beta test the python interface (once available)?
- Please use the QR code
- Questions?



# Contact Information

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