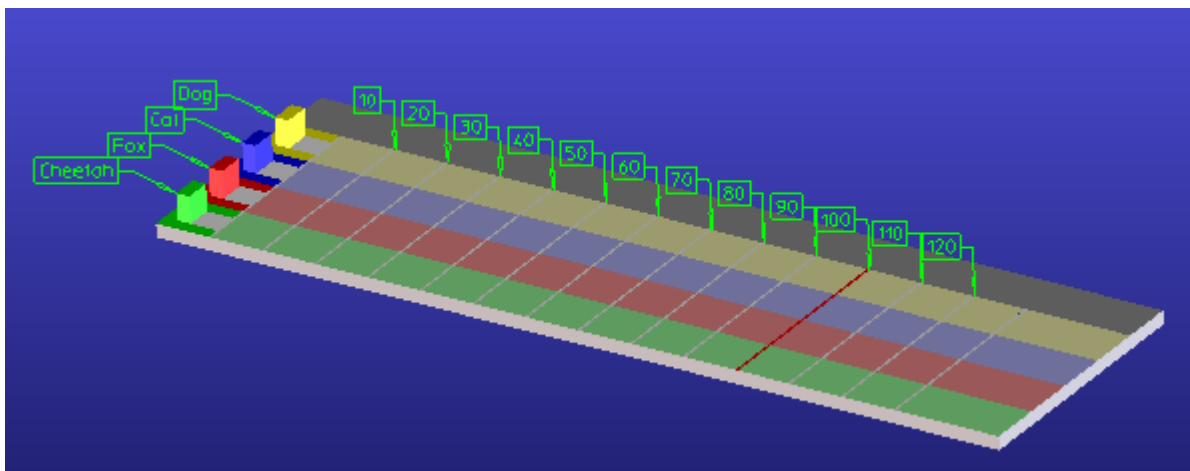
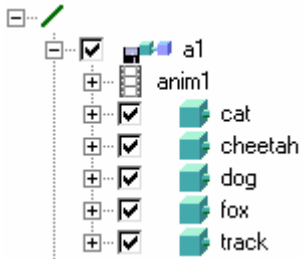


Animation of a 100m race modeled in OSDM 13.0

This example illustrates concepts and structure of an animation sequence in OSDM 13.0. A cat, a dog, a fox and a cheetah are doing a 100m race. The four animals are modeled as simple blocks grouped in an assembly in OSDM.

Assembly:



Scenario:

- The dog runs constantly from 0 to 100m in 10 seconds.
- The cat starts fast and gets slower towards the end.
- The fox runs slowly at the beginning and gets faster towards the end.
- The cheetah (because it's so fast) decides to start later.

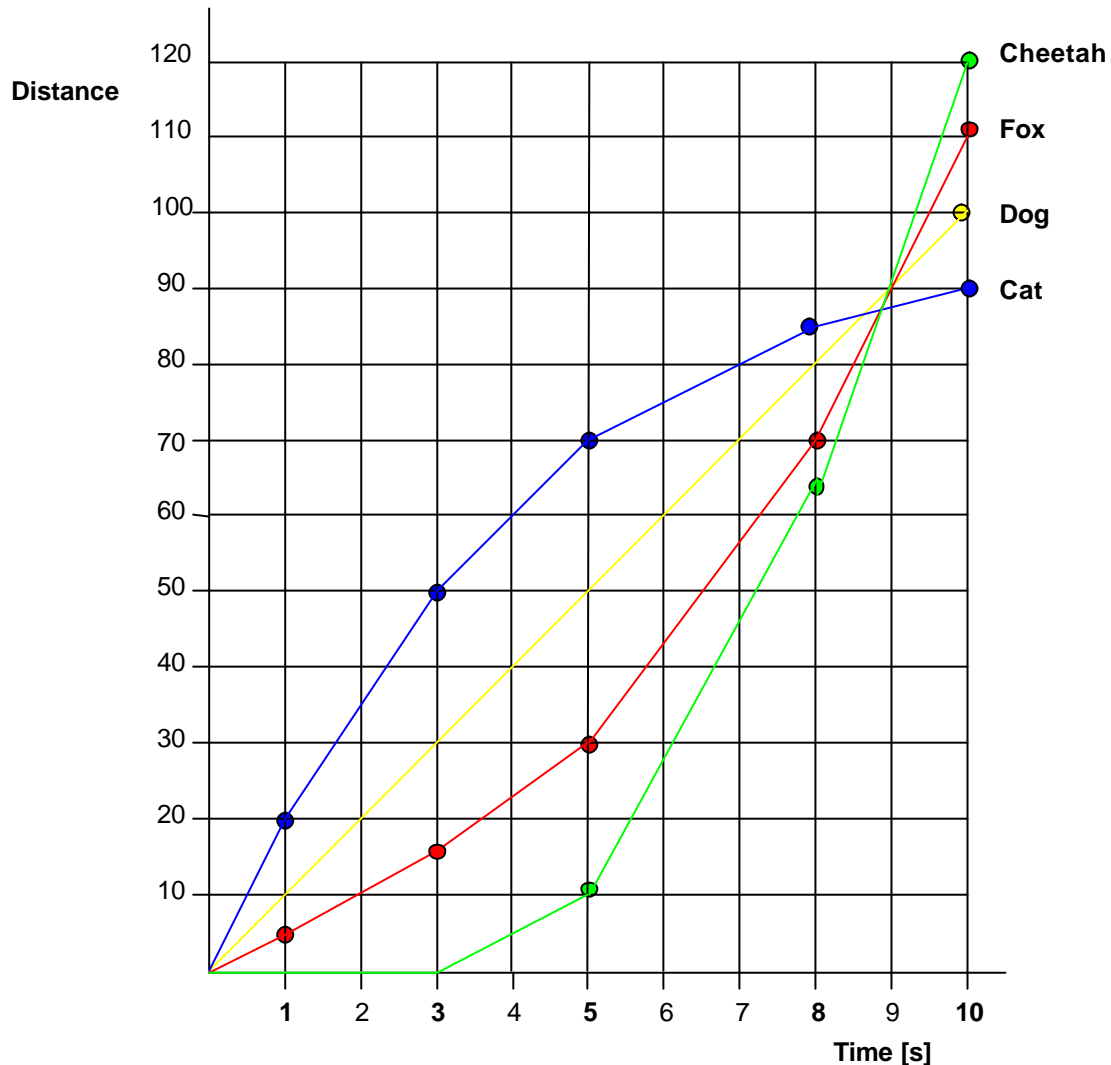
Definition of Animation data:

The table below shows the Animation sequence as it is planned for the race. The duration of the race should be 10 seconds. At each point of the time scale positions for each individual part can be defined through control positions. This means at each control position each part of the assembly can be assigned an explicit position.

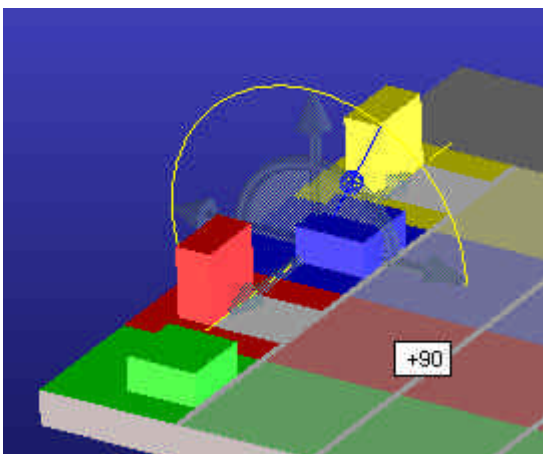
Time	0	1	2	3	4	5	6	7	8	9	10
Dog	0										100
Cat	0	20		50		70			85		90
Fox	0	5		15		30			70		110
Cheetah	0					10			65		120

Please note, that although the animation runs for 10 seconds, it's not necessary to specify a specific position for each single step. If the user doesn't specify a position, the system uses an interpolation technique to calculate the position.

The diagram below shows the **expected** Positions of the individual animals over the time. The round bullets mark the control positions to be defined when setting the animation.



Define the start position



At the beginning of the animation sequence you can specify a so-called start position for the parts involved. This is necessary if the parts should have different start positions than their original positions at the beginning of the animation. The original position of the parts is called Reset Position.

In our example the start position is defined as follows:

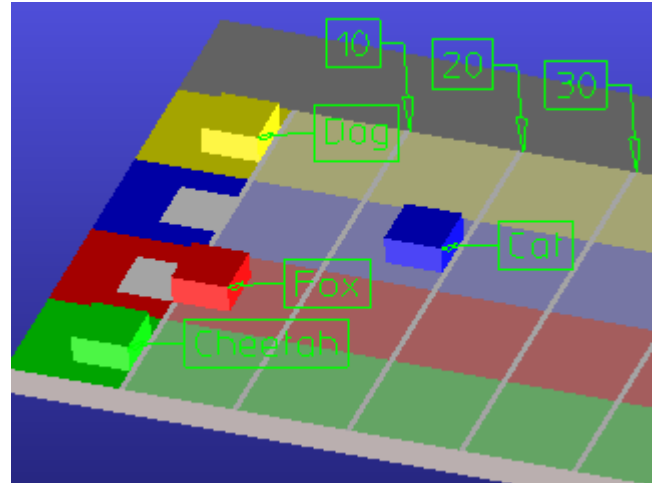
1. Open the **DEFINE ANIMATION** dialog, create a new animation.
2. Switch from **ADD/INSERT** mode to **MODIFY** mode.
3. Rotate all parts one by one as indicated in the picture by 90 deg
4. When all animals are positioned to the start line click **CAPTURE**.

1) Define the control positions of the animation

- Open the **DEFINE ANIMATION** dialog, create a new animation.
- Switch from **MODIFY** mode to **ADD/INSERT** mode.
- **Time 1 sec:** Move the cat to 20m and the fox to 5m and click **CAPTURE**.

Now the first control position after a time step of 1 second has been defined for the fox and the cat. As indicated in the table above the other two parts don't get explicit control positions defined at this time step.

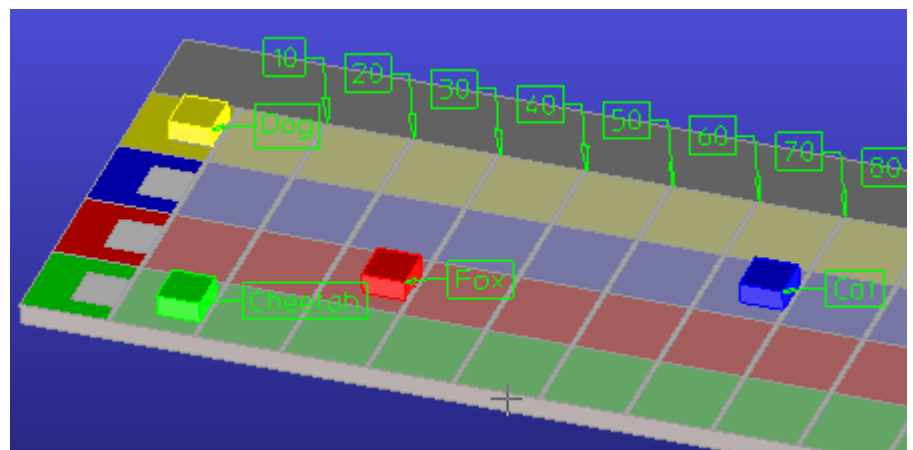
Subsequently all animation steps are entered for the steps defined in the above table:



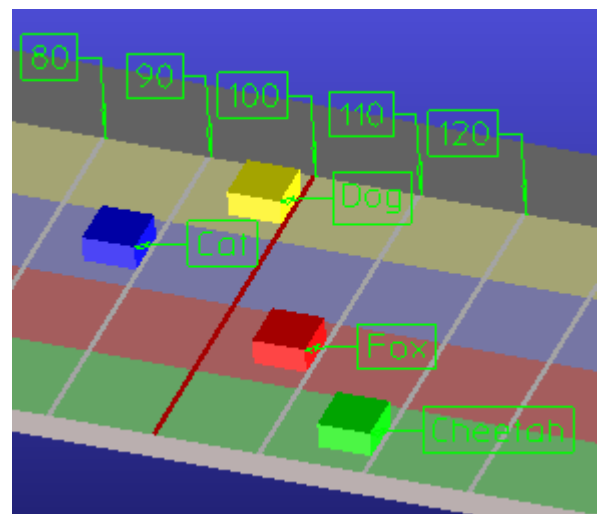
- **Time 3 sec:** For the next step is defined at 3 seconds we now change the insert time to 2 seconds and move the cat to 50m and the fox to 15m and click **CAPTURE**.

- **Time 5 sec:** Move the cat to 70m, the fox to 30m and the cheetah to 10m and click **CAPTURE**

At this point the first control position for the cheetah is defined.



- **Time 8 sec:** Change the insert time to 3 seconds, move the cat to 85m, the fox to 70m and the cheetah to 65m and click **CAPTURE**
- **Time 10 sec:** Change the insert time to 2 seconds, position the dog to 100m, the cat to 90m, the fox to 110m and the cheetah to 120m and click **CAPTURE**.
- Click **OK**



Resulting Animation:

Time	0	1	2	3	4	5	6	7	8	9	10
Dog	0	0	0	0	0	0	0	0	0 (*)	50	100
Cat	0	20	35	50	60	70	75	80	85	87.5	90
Fox	0	5	10	15	22.5	30	43.3	56.6	70	90	110
Cheetah	0	0	0	0 (*)	5	10	30	50	65	92.5	120

Note: The black bold numbers indicate control positions explicitly defined by the user. The blue bold numbers (*) are control positions automatically inserted by the system.

If you play the animation or look at the above table with the interpolated positions (in blue) added you'll see the cat and the fox are following their defined data. Also the cheetah stays at 0m until step 3 and moves to 10m in step 5. But the dog moves completely wrong. It stands at the start line and waits 8 seconds and then it runs 100m in 2 sec (it must be a rocket dog).

Explanation: When a part is moved for a specific time step and you click CAPTURE the system is doing the following:

- The new positioning data is entered at the current time position.
- If there is **no** positioning data available at the **previous** step, the **old** positioning data is added to the **previous** step.

In the example table above they're marked with (*).

- Dog: Only one control position (100m) was defined (at 10 sec). Therefore the old position (0 m) is used for the previous step (at 8 seconds)
- Cat and fox have defined positions at each step - no automatic control positions here
- The cheetah has its first position at 5 seconds. Therefore the previous position (0m) is automatically inserted as a control position for the previous step (3 seconds) . This means the cheetah starts to move at 3 sec and ends up at the defined position (10m) at 5 seconds.

2) Correcting the animation for the dog

- Start the **DEFINE ANIMATION** command again, select the **ANIMATION**.
- Navigate to time position = 8 seconds.
- Click **DELETE**
- In the delete subaction click **SPECIFIC** and select the dog.
- Click **ACCEPT**

Resulting animation data after the modification (*please note that the following table contains the interpolated values in parenthesis*):

Time	0	1	2	3	4	5	6	7	8	9	10
Dog	0	10	20	30	40	50	60	70	80	90	100
Cat	0	20	35	50	60	70	75	80	85	87.5	90
Fox	0	5	10	15	22.5	30	43.3	56.6	70	90	110
Cheetah	0	0	0	0	5	10	30	50	65	92.5	120

As the automatically created control position for the dog for step 8 sec is now deleted, the positions for the steps 0 to 10 seconds are now interpolated correctly.

3) Deleting a control position and shorten the animation

- Start the **DEFINE ANIMATION** command again, select the **ANIMATION**.
- Navigate to time position = 8 seconds.
- Click **DELETE**
- In the delete subaction click **All + SHORTEN ANIMATION**
- Click **ACCEPT**

The result is as follows

Time	0	1	2	3	4	5	6	7
Dog	0	10	20	30	40	50	75	100
Cat	0	20	35	50	60	70	80	90
Fox	0	5	10	15	22.5	30	70	110
Cheetah	0	0	0	0	5	10	65	120

The time step 8 seconds including the the time interval between the current and the previous step has been deleted. Without using the **SHORTEN ANIMATION** option the duration of the race would have remained 10 seconds and only the control positions at time step 8 would have been deleted. The result would have been like this:

Time	0	1	2	3	4	5	6	7	8	9	10
Dog	0	10	20	30	40	50	60	70	80	90	100
Cat	0	20	35	50	60	70	74	78	82	86	90
Fox	0	5	10	15	22.5	30	46	62	78	94	110
Cheetah	0	0	0	0	5	10	32	54	76	98	120

As no control positions are defined between 5 and 10 seconds the positions of the parts are interpolated in between.

Copy a control position

Copying a control position means you navigate to a time step where you want to copy control positions to and you select a time step where you want to take a defined control position from.

Please note: The **MOVE/COPY** subaction only works for explicitly defined positions (not interpolated positions). That means in our example

- you can move/copy the control positions of **all** animals at 10 seconds
- but you can only move/copy the control positions of the **cat** and the **fox** at 3 seconds.

Use the original animation from above before deleting positions (2))

- Start the **DEFINE ANIMATION** command again, select the **ANIMATION**.
- Navigate to time position = 5 seconds.
- In the **MOVE/COPY** subaction select **ALL** and select **COPY**
- As **SOURCE** choose time step 3 seconds
- Click **ACCEPT**
- In the main dialog click **OK**

The result is as follows:

Time	0	1	2	3	4	5	6	7	8	9	10
Dog	0	10	20	30	40	50	60	70	80	90	100
Cat	0	20	35	50	50	50	61.7	73.3	85	87.5	90
Fox	0	5	10	15	15	15	33.3	51.6	70	90	110
Cheetah	0	0	0	0	0	0	23.3	46.6	65	92.5	120

The control positions for the cat, the fox and the cheetah have been copied to time step 5 seconds. For the dog no control position at step 3 seconds existed so no control position for it is copied. Interpolations for the intermediate time steps are interpolated.

Move a control position

Moving Copying a control position means you navigate to a time step where you want to move control positions to and you select a time step where you want to take a defined control position from. In contrast to copy, this option also deletes the source time step if no remaining control positions are left. When using the **ALL** option the source time step is always deleted.

Again based on the original animation form above do the following steps:

- Start the **DEFINE ANIMATION** command again, select the **ANIMATION**.
- Navigate to time position = 5 seconds.
- In the **MOVE/COPY** subaction select **ALL** and select **MOVE**
- As **SOURCE** choose time step 3 seconds
- Click **ACCEPT**
- In the main dialog click **OK**

Time	0	1	2	3	4	5	6	7	8	9	10
Dog	0	10	20	30	40	50	60	70	80	90	100
Cat	0	20	27.5	35	42.5	50	61.7	73.3	85	87.5	90
Fox	0	5	7.5	10	12.5	15	33.3	51.6	70	90	110
Cheetah	0	0	0	0	0	0	23.3	46.6	65	92.5	120

This time the control positions of step 3 seconds have also been copied to step 5 seconds, but in addition the control positions at 3 seconds have been deleted.

With the **SPECIFIC** option instead of **ALL** you could have selected a specific part for which the MOVE control positions should be applied. In this case the control positions for the other parts remain untouched, and the time step remains as well.