Concept for MASTER/DEP State Machine ("Load Sensor" for External Prototypes)

Motivation: (a)
========== VRML/X3D Browsers may load files asynchronously.
I.e., if a file refers to other files, then it may happen that one file finishes loading before the other files finish.
Hence it may happen that events passed from a node of one file to a node of another file may get lost.
This is particularly true for events that are sent from the initialize() function of a Script node over file borders.
(b)
Sometimes, we load parts of the scene dynamically (using the Browser.createVrmlFromURL() method). It may happen that the loaded part of the scene gets initialized, before we insert it to a Group node and before we create dynamic routes to exchange events with the loaded part of the scene. Hence the simple solution of just outputting an event from the loaded part of the scene, as soon as it gets initialized, may fail.

Summary:
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A simple concept is developed, where each external prototype has to contain a "dependent" Script node (DEP) and where the loading file (the file which contains the proto instances) contains a "master" Script node (MASTER) and some routes between the proto instances and the MASTER.
As soon as all external prototypes are loaded, the MASTER distributes a "basicInit" event to all prototypes. Hence the prototypes can exchange events arbitrarily during "basic initialization" without loosing events.
The term "basic initialization" refers to the initialization, which is triggered by the mechanisms of the present concept, it is performed AFTER the "normal Web3D initialization" (initialize()).

Scenario I: MASTER and DEP are loaded and initialized synchronously
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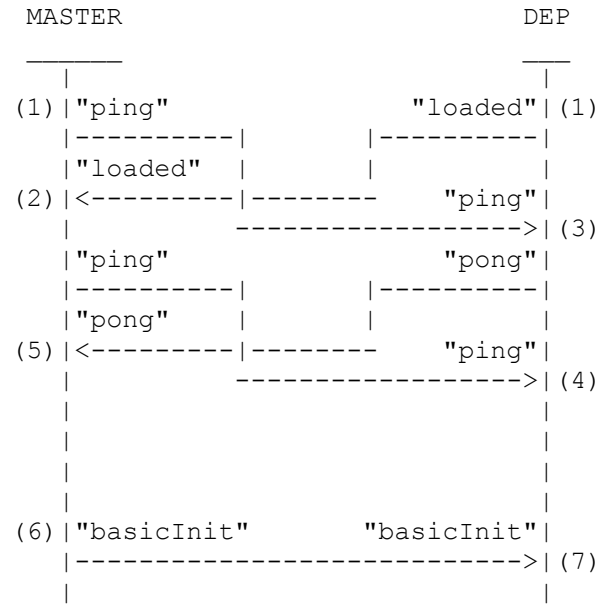

(1)...MASTER and DEP are initialized, send "ping" and "loaded", resp.
(2)...MASTER receives "loaded" and sends another "ping"
(3)...DEP receives "ping" and responds with "pong" (first "ping")
(4)...DEP receives a second "ping" and ignores it
(5)...MASTER receives "pong" and increments DEP counter
(6)...as soon as DEP counter reaches the maximal value (now all DEPs are loaded and initialized), then MASTER sends "basicInit"
(7)...all DEPs are "basically initialized" now, they may exchange events arbitrarily without any event getting lost

Scenario II: MASTER is loaded and initialized first
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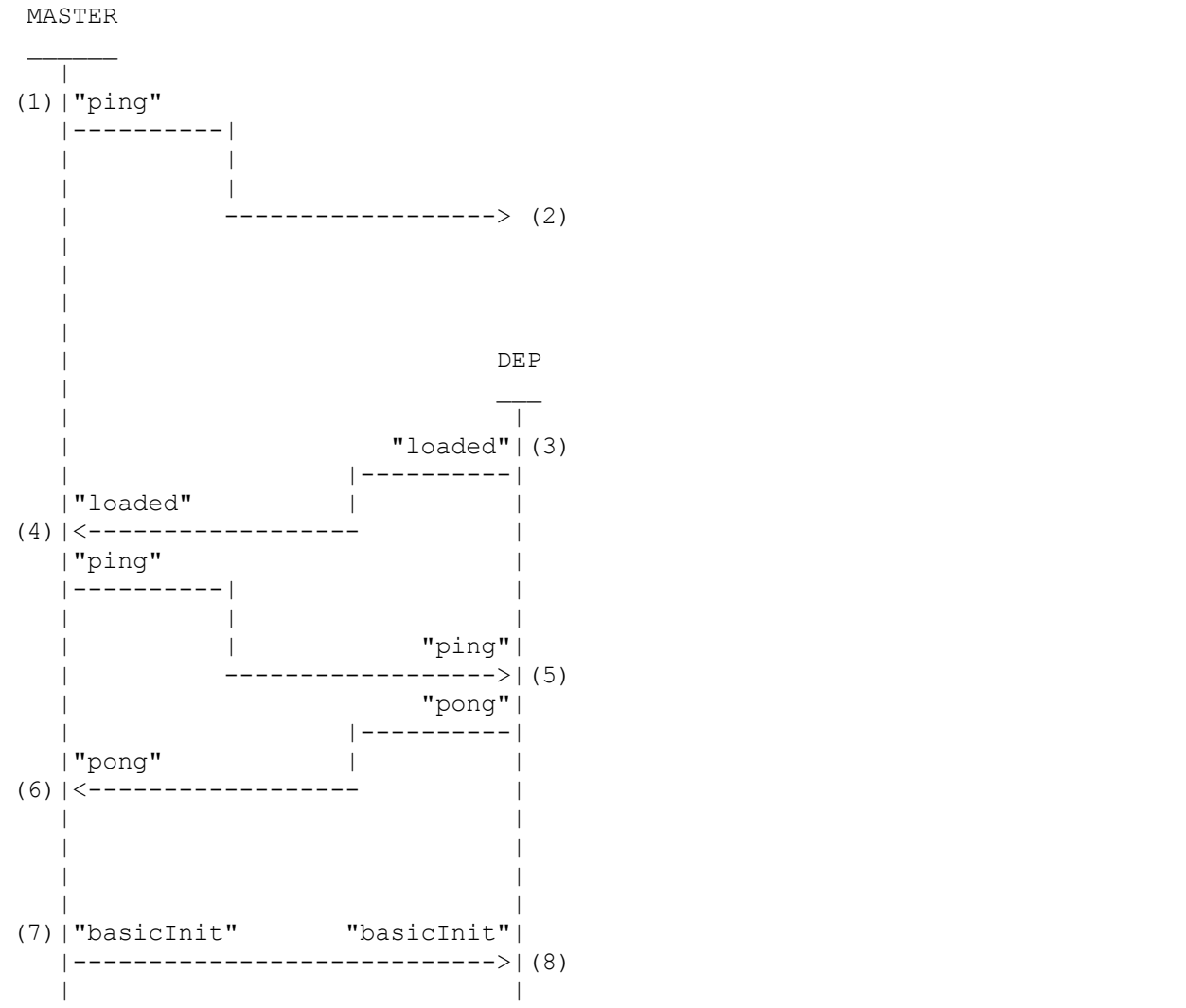

(1)...MASTER is initialized and sends "ping"
(2)...the first "ping" gets lost
(3)...DEP is initialized and sends "loaded"
(4)...MASTER receives "loaded" and sends another "ping"
(5)...DEP receives "ping" and responds with "pong"
(6)...MASTER receives "pong" and increments DEP counter
(7)...as soon as DEP counter reaches the maximal value (now all DEPs are loaded and initialized), then MASTER sends "basicInit"
(8)...all DEPs are "basically initialized" now, they may exchange events arbitrarily without any event getting lost

Scenario III: DEP is loaded and initialized first
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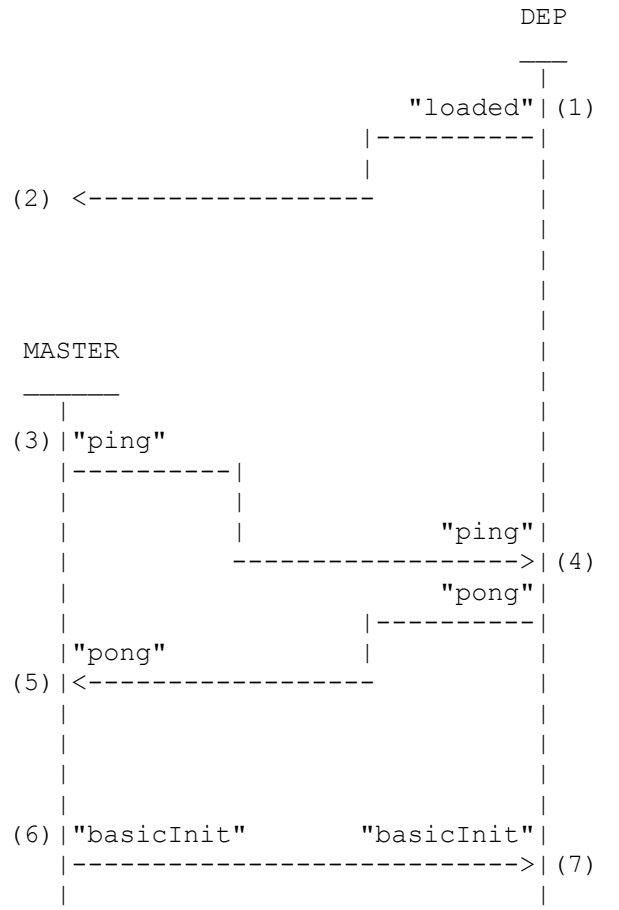

(1)...DEP is initialized and sends "loaded"
(2)...the "loaded" gets lost
(3)...MASTER is initialized and sends "ping"
(4)...DEP receives "ping" and responds with "pong"
(5)...MASTER receives "pong" and increments DEP counter
(6)...as soon as DEP counter reaches the maximal value (now all DEPs are loaded and initialized), then MASTER sends "basicInit"
(7)...all DEPs are "basically initialized" now, they may exchange events arbitrarily without any event getting lost

Resulting Description of the Concept
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(A) The loading file contains a Script node "MASTER" and routes between the MASTER and the proto instances
(B) Each proto declare of the external prototypes contains a Script node "DEP"
(C) In case of nested prototypes, the Scripts in the intermediate prototypes take care about the "MASTER duties" and about the "DEP duties"
(D) Each MASTER has an "initializeOnly" "SFInt32" that indicates the number of dependents ("numDeps")
(E) Each MASTER has an "outputOnly" "SFBool" "sendPing"
(F) Each DEP has an inputOnly" "SFBool" "receivePing"
(G) Each DEP has an "outputOnly" "SFBool" "sendLoaded"
(H) Each MASTER has an "inputOnly" "SFBool" "receiveLoaded"
(I) Each DEP has an "outputOnly" "SFBool" "sendPong"
(J) Each MASTER has an "inputOnly" "SFBool" "receivePong"
(K) Each MASTER has an "outputOnly" "SFBool" "sendBasicInit"
(L) Each DEP has an "inputOnly" "SFBool" "receiveBasicInit"
(M) Each MASTER has an "inputOutput" "SFInt32" "depCounter" "0"
(N) Each DEP has an "inputOutput" "SFBool" "ignorePing" "true"
(O) Behaviour of the MASTER

```
function initialize()
{
  if (numDeps)
    sendPing = true;
  else
    sendBasicInit = true;
}
function receiveLoaded()
{
  sendPing = true;
}
function receivePong()
{
  if (depCounter < numDeps)
  {
    if ((++depCounter) >= numDeps)
    {
      sendBasicInit = true;
    }
  }
}
```

(P) Behaviour of the combined MASTER/DEP

```
function initialize()
{
  if (numDeps)
    sendPing = true;
  else
    iAmLoaded();
}
function iAmLoaded()
{
  ignorePing = false;
  sendLoaded = true;
}
function receiveLoaded()
{
  sendPing = true;
}
function receivePing()
{
  if (!ignorePing)
  {
    ignorePing = true;
    sendPong = true;
  }
}
function receivePong()
{
  if (depCounter < numDeps)
  {
    if ((++depCounter) >= numDeps)
    {
      iAmLoaded();
    }
  }
}
function receiveBasicInit()
{
  // TO DO: do my basic initialization here
  sendBasicInit = true;
}
```

(Q) Behaviour of the DEP

```
function initialize()
{
  ignorePing = false;
  sendLoaded = true;
}
function receivePing()
{
  if (!ignorePing)
  {
    ignorePing = true;
    sendPong = true;
  }
}
function receiveBasicInit()
{
  // TO DO: do my basic initialization here
}
```