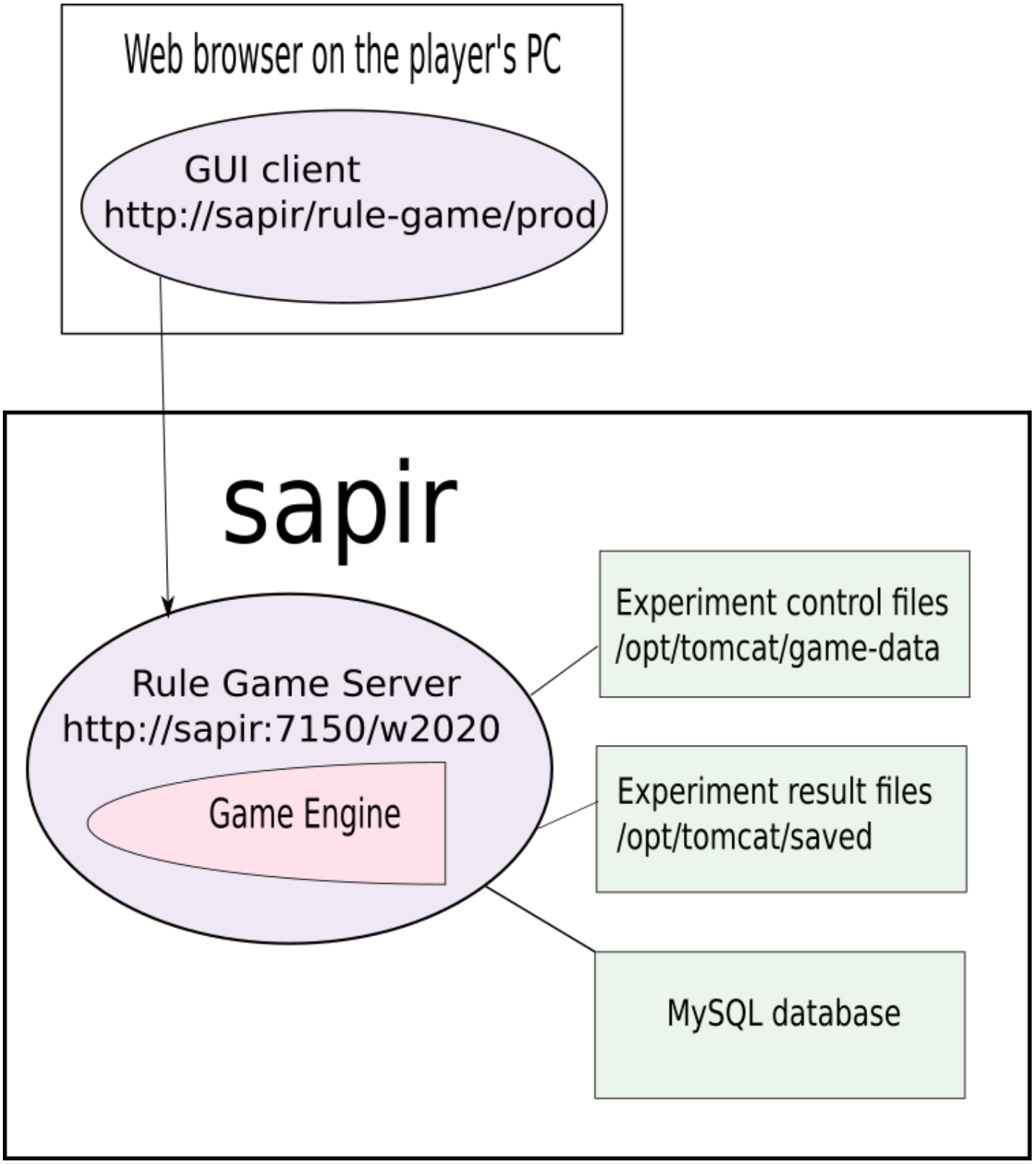
Rule Game Server Update

March 29, 2021

Documentation:

- http://sapir.psych.wisc.edu:7150/w2020 -- Prodution (v 1.*)
- http://sapir.psych.wisc.edu:7150/w2020-dev -- Development (v 2.*)

Overall Game Server Architecture



What's new in Game Server 2.*

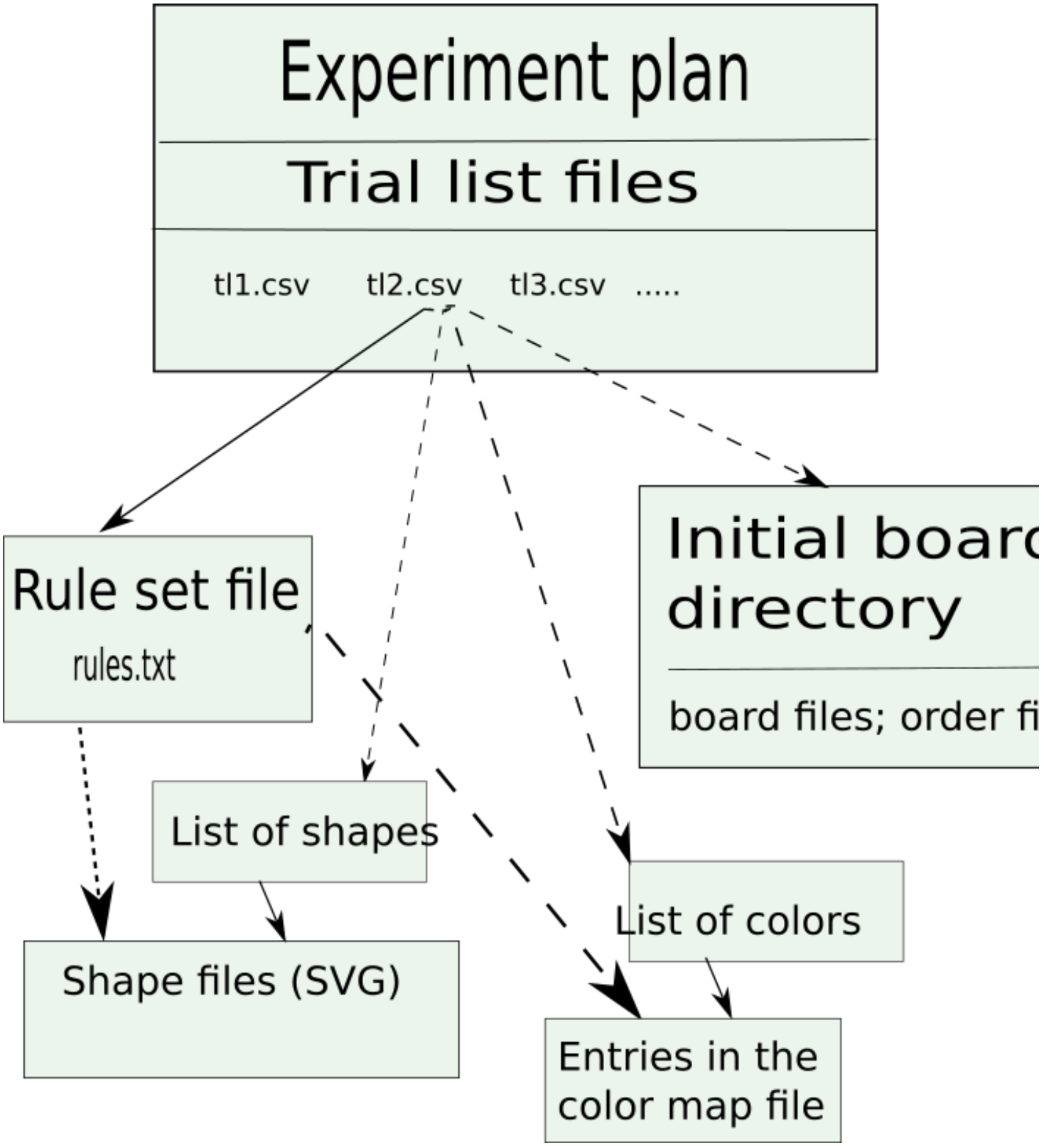
- Custom colors
- Custom shapes
- Subdirectories
- "Pick" operation
- New balancer
- Rule syntax enhancements
- Experiment plan validator
- Version check
- Backward compatibility
- Captive Game Server can emulate Web Game Server more closely

Custom colors and shapes

- Use arbitrary colors names
- List colors in the color map file
- Use arbitrary shape names (subdir OK)
- Provide an SVG file for each shape (maybe in a subdir)

Structure of an experiment plan

Experiment control files:



You can use subdirectories

- For each kind of files, a directory under `/opt/tomcat/game-data`:
  - `trial-lists`
  - `rules`
  - `boards`
  - `shapes`
- For each experiment, you can use an experiment-specific subdirectory for...
  - rule set files
  - initial board files
  - shape files
- A single color map file for all colors, though
- More manageable data for multiple experiments

"Pick" operation

- New trial list parameters to control user experience:
  - `feedback_switches=fixed`: the player sees which game pieces are movable
  - `feedback_switches=free`: the player does not know which pieces are movable until he tries
  - `free_wrong_cost=`*`0.3`*: the cost of a move attempt ("pick") on an immovable piece
- I believe the new version of GUI client supports this (need to check)

New balancer

- Automatic "balancing" when assigning new players to trial lists
- Old: goal = equalize the number of players initially assigned to each trial list
- New: goal = equalize the number of players "active" in each trial list
- "Active player" = either
    - Received a completion code
    - Very recently registered, and, hopefully, still playing
- Experiment manager can create a "defect file" to e.g. account for players who received a completion code, but should be ignored

Rule syntax enhancements

An *atom* of a rule line:

```
(count, shapes, colors, positions, buckets)
```

All-new destination bucket arithmetic:

- Set arithmetic: every expression is interpreted as a set
- Variables such as *p,pc,ps* evaluate to an empty set [] or a set of 1 element
- Set union: [S1, S2]
- Arithmetic on sets produces a cross product:
  - [] + [x,y] = []
  - [a] + [x,y] = [a+x,a+y]
  - [a,b] + [x,y] = [a+x,a+y,b+x,b+y]
- Equality operation: [x1,x2,...]==[y1,y2,...] gives:
  - empty set [] (if the two sets have no elements in common);
  - [1] (if the two sets have at least one common element).
- Negation:
  - ![] gives [1];
    ![any non-empty set] gives [].
- Modulo-4 postprocessing
- Can do fairly complex logic, e.g.
  - [!p*[0,1,2,3], !!p*(p+1)] : start with any bucket, then continue clockwise

Backward compatibility

An older version of the GUI client will still work with the new (2.*) Game Server
- An older experiment plan (from the 1.* era) will still work correctly with the 2.* Game Server

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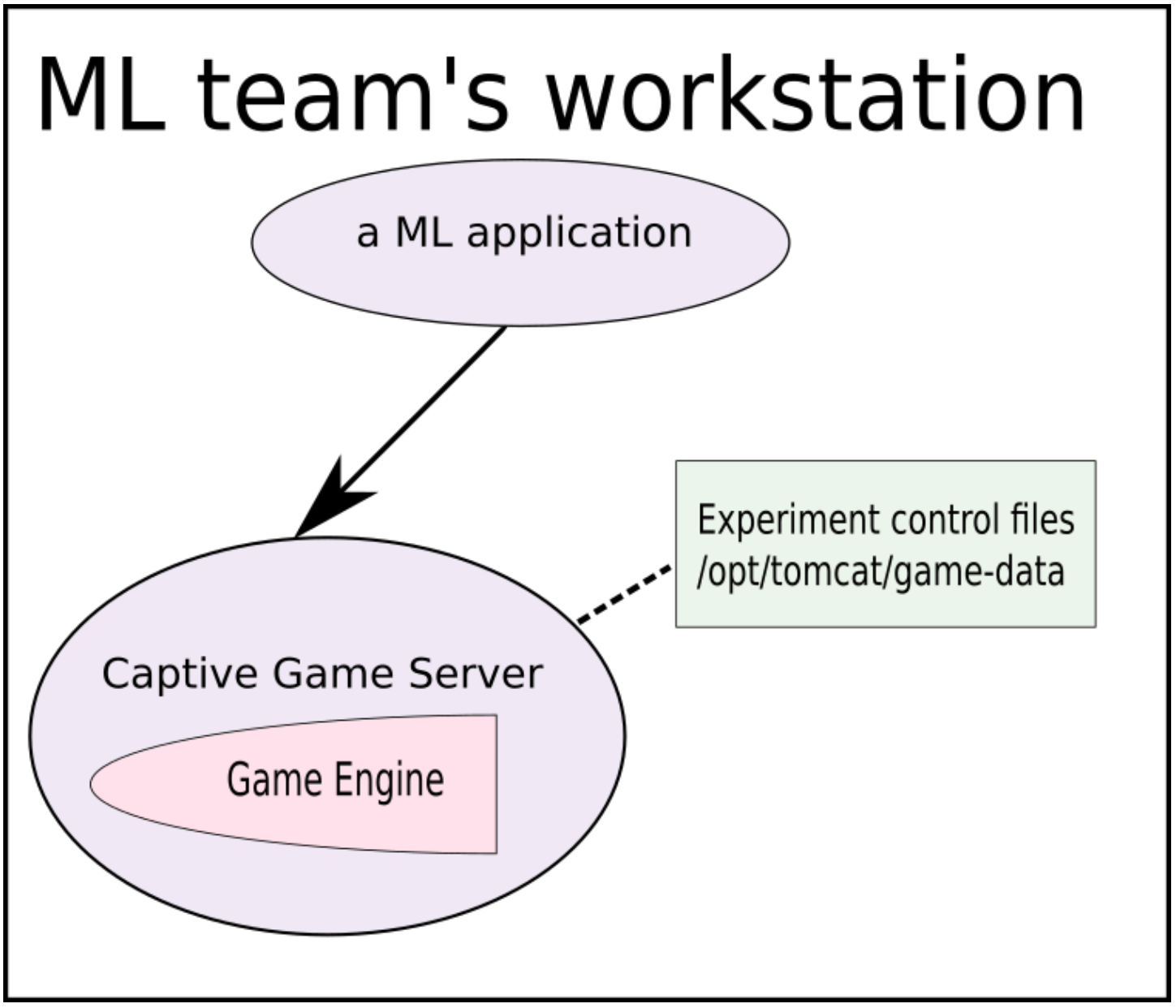
- Prod:
  - Client: `http://sapir.psych.wisc.edu/rule-game/prod/`
  - Server: `http://sapir.psych.wisc.edu:7150/w2020`
- Dev:
  - Client: `http://sapir.psych.wisc.edu/rule-game/dev/`
  - Server: `http://sapir.psych.wisc.edu:7150/w2020-dev`

Let's promote dev to prod

- Let's do a bit of testing on dev...
- and then promote it to prod!

New in the Captive Game Server



- Better compatibility with the human subject experience
- Can feed a trial list file to the Captive Game Server, and tell it to play as per the parameter set in a specific line.
  Not trying to emulate the flow control of human-subjects experiments:
  - transition between normal series and bonus series;
  - ending normal or bonus series
  - rewards