**Dasu**

Experimentation platform running on end-hosts

- Extensible, programmable and secure
- Built-in broadband characterization capabilities (incentive for adoption)
- Supports third-party experiments

*Dasu clients are assigned to tasks based on experiment specs and resource availability*

**Experiment Admin Service**

Management of experiments done by the Experiment Administration (EA) Service

EA Service assigns tasks to clients based on experiment specs and client characteristics

- E.g. IP prefix, geographic location, operating system, etc.

For example: Random sample of DSL users in Boston

**Tiered architecture**

Dasu EA Service uses a two-tiered architecture

- **Primary EA Server**
  - Allocates clients to experiments
  - Assigns clients to Secondary EA server, based on clients’ characteristics and availability
  - Mediates all communication with Dasu clients
  - Authenticates and signs assigned experiments

- **Secondary EA Server**
  - Task parameterization and allocation of tasks to clients per experiment’s logic

**Running experiments**

A research group hosts a Secondary EA server

Provide the Dasu Admins:

- Experiment logic (rules file)
- The location of Secondary EA Server
- Desired client characteristics

The Dasu Admins:

- Add Secondary EA server to Primary EA server known set
- Configure Data Reporter to forward experiment results to Secondary EA when submitted by clients

**Delegating Code Execution to Clients**

1. Experiment?
2. Experimenter
3. Experiment assignment
4. Signed experiment
5. Results

**Experiment delegation**

Delegation

1. Clients announce their specific characteristics (e.g. IP prefix, connection type) and request new experiment tasks
2. Primary EA server allocates clients to experiments, assigning them to Secondary EA server based on clients’ characteristics and resource availability
3. Secondary EA server parameterizes and allocates tasks to clients based on experiment’s logic
4. Primary server authenticates received experiment and digitally signs before assigning to clients
5. Client completes experiment and sends results to Data Reporter
6. Data Reporter forwards result to appropriate Secondary EA Server

**Sample Experiment**

Researchers submit an experiment rules template file for approval

Once approved, client requests are redirected to corresponding Secondary EA server which provides agreed upon parameters

Experiment template is filled with provided parameters and sent to Dasu client (signed by Primary)

**Experiment Rules Template**

```java
dialect "java"
package edu.northeastern.dasu.drools;
import edu.northeastern.dasu.drools.*;
global Fact:halt;
declare TestResult
taskId : String
todoList : List
pingList : List
end

function void ping(String ip, int taskId) {
  ProbeTask task = new ProbeTask(
    taskId, ip, ProbeType.PING);
  AMCoordinatorV2.addProbeTask(task);
}

rule "Bootstrap rule"
when
  not( exists( TestResult() ) )
then
  TestResult tr = new TestResult();
tcsetTaskId("<TASKID>");
tcsetTodoList(new ArrayList());
tcsetPingList(new ArrayList(new String[]{"<IPLIST>"}));
tr.setTaskId(taskId);
insert(tr);
  pingList(tr.getTodoList()).remove(0),
tcgetTaskId();
end

rule "Process Probes"
when
  $str : TestResult();
  $ping : FactProbePingResult();
then
  $str.addPingList($ping);
  retract($ping);
  if($str.getTodoList().size() == 0) {
    AMCoordinatorV2.commitResult("ABC Experiment", $str);
    halt.setHalt(true);
  } else {
    ping($str.getTodoList()).remove(0), $str.getTaskId();
  }
end
```

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