Bachelor Thesis
Expansion of a Task Distribution Framework

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Outline

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1. Background
2. Goal
3. Design
4. Implementation
5. Conclusion

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Background - Task Distribution Systems I

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Certain kind of Problems

- Huge tasks
  - too big for single Computer
- Parallelization possible
- relatively small subtasks

Solution: Task distribution

- multiple Computers
- Breaking up the Task into small Subtasks
- all Computers work on Subtasks
- many small computers possibly cheaper than one big one
- more reliable due to redundancy

Background - Task Distribution Systems

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- existing Task Distribution Framework by Jan Dillmann
- Shared memory distributed Sytem
- User inserts Task information into Database
- Clients fetch task information from passive server
- executables fetched from external source
- Clients push task result to server

Problems

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- no convenient way to interact with system
- Clients access database directly
- Tasks fetched from Database one by one
- User has to write and read Database directly
- only raw result data
- no information about eventual fails except output from Worker

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Goal

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- introduce Task Lists
- Design and implement commandline user interface to system
  - must be suitable for automation
- implement Logging to collect additional data
- use Logging data to make statistical analysis
- present Results of analysis in easily accessible form

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Design I - Tasks

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- Clients no loger handle single Tasks
- Lists of tasks are created when (re)queueing
- failure of a single Task has no impact on rest of List

Design II - Server Actions

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- Creation and management of Tasks done via command line tools
- one executable for each action
- input and output via stdin/stdout
  - easily parsable and human readable format
- configuration in textfile (host, port, password, etc)

Design III - Logging

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- As simple as possible
- a few messagetypes
- timing relevant
  - for example: duration=endTimestamp-startTimestamp

Design IV - Statistics

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- based on Logfiles
- Modular design
- every step one module
  - calculations in one module
  - presentation in another module

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Implementation I - Server Actions

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- Each Server action is an independent executable with standardized interface
- input and output of server actions in a format that is both machine readable and human readable
  - compromise found with JSON
- implemented in Java to maximize use of existing functionalities

Implementation II - Task Lists

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- Server actions collect tasks in lists, so that a client may fetch more than one task.
- User has only rudimentary control over the structure of the Lists
  - length of lists configurable for server action
  - Sorting of tasks after single attribute (e.g. closest deadline first)
  - choice of strategy to handle lists which are not full

Implementation III - Logging

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- extremely simple
  - a daemon listens for strings on a configurable socket
  - clients send their messages to the socket
  - daemon writes strings to file
  - logfile name is configurable and dependent on date and time
- chosen over more complicated solutions for simplicity
  - for example: syslog is more complex than our whole server structure

Implementation IV - Statistics

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- a module is an executable
- a wrapper handles module execution
- modules operate on input files given via commandline
- modules produce one output file via stdout
- wrapper writes output to file

Implementation V - Wrapper

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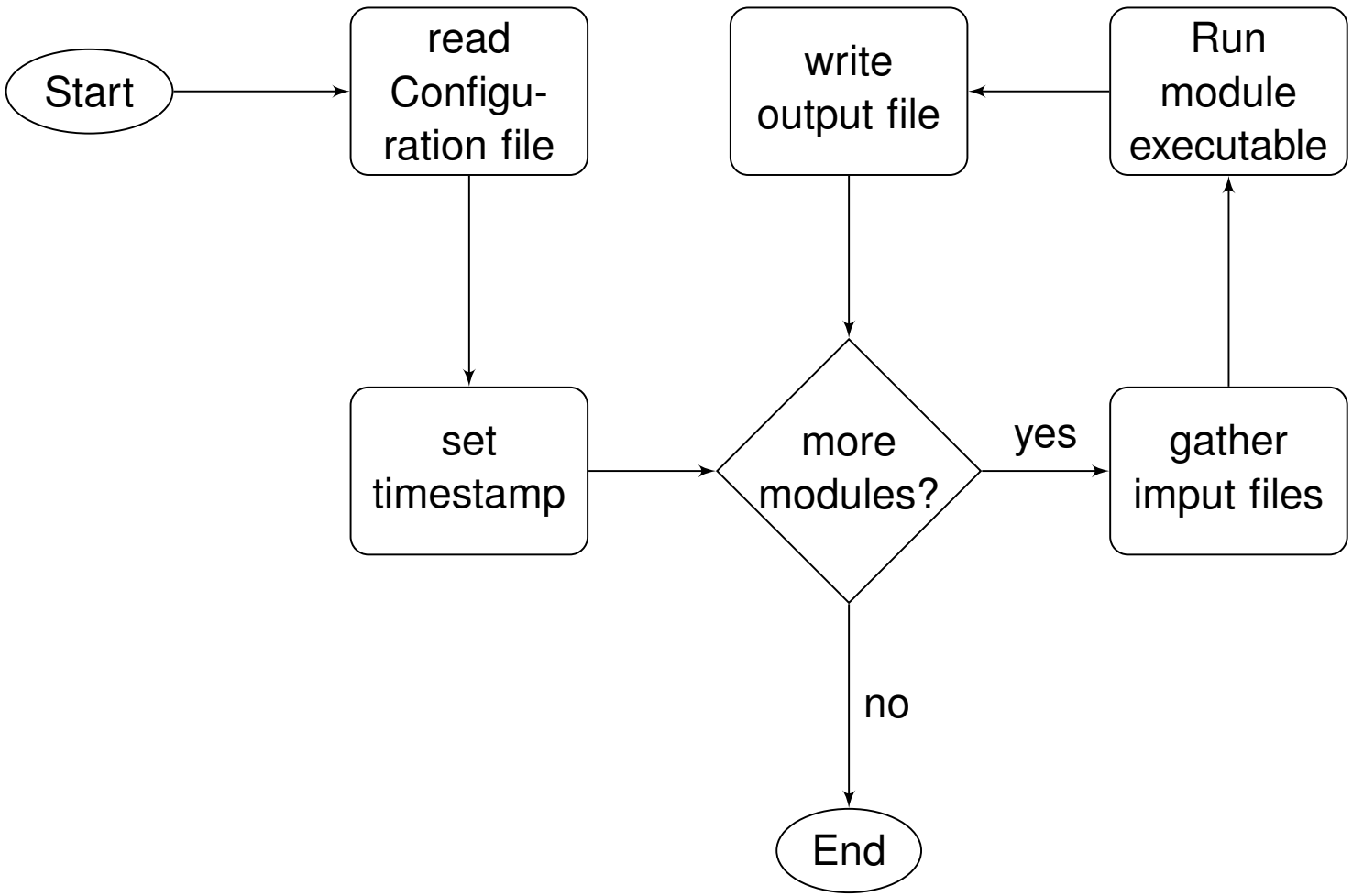

Implementation VI - Modules I

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```
#!/bin/bash
tmpfile=‘mktemp‘
cat "$@" > $tmpfile

delim=","

cut -d"$delim" -f3 $tmpfile | uniq | while read host ; do
echo -n "$host "
grep $host$delim $tmpfile | grep -ic Task_Claim | tr -d "\n"
echo -n " "
grep $host$delim $tmpfile | grep -ic Task_Success | tr -d "\n"
echo -n " "
grep $host$delim $tmpfile | grep -ic Task_Fail

done | sort
rm $tmpfile
```

Implementation VII - Modules II

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```
Host1 256 212 44
Host2 284 156 128
Host3 272 240 32
Host4 307 257 50
Host5 302 259 43
```

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Conclusion

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- System now has simple User Interface
- highly configurable Statistics