HOCHSCHULE
RAVENSBURG-WEINGARTEN
UNIVERSITY
OF APPLIED SCIENCES

Meins titel

Masterthesis

at the University of applied science Ravensburg-Weingarten

by

NAME

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Author's declaration

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ORT, Monat Jahr

_____

NAME

Abstract

An abstract is a brief summary of a research article, thesis, review, conference proceeding or any in-depth analysis of a particular subject or discipline, and is often used to help the reader quickly ascertain the paper's purpose. When used, an abstract always appears at the beginning of a manuscript, acting as the point-of-entry for any given scientific paper or patent application. Abstracting and indexing services for various academic disciplines are aimed at compiling a body of literature for that particular subject.

The terms précis or synopsis are used in some publications to refer to the same thing that other publications might call an "abstract". In "management" reports, an executive summary usually contains more information (and often more sensitive information) than the abstract does.

Quelle: http://en.wikipedia.org/wiki/Abstract_(summary)

Contents

1 Introduction

My:

Fast and realistic hair rendering

- Why render hair?
  - Why not.
- What is to be expected in this work.
  - New approach for simulation (Tractrix)
  - New approach for rendering as B-Splines as particle basis.
  - Try to get it to 60 fps without to much optimization (as I dont have the expertise especially in Compute)
- What are the problems with hair:
- Sehr grafisch und natürlich erklären.
- Talk schreiben -> Gezwungen sehr high level zu bleiben.
- Sollte halt motivieren
  - On part simulation -> Mass of hair
  - Shit ton of geometry
  - Rendering -> Thin, structure
  - Finding mass spring constants / Simulation constants

2 Related Work

[Physical basics] [Only scrap the surface and relate to other papers for details] Hair structure/attributes:

- Huge amount of geometry / Hair (100k strands)
- Semi transparent
  - Stacked cones
  - Mostly opaque wall, but transparent core
- Anti aliasing, because one hair is scudding thin
- Flexible in rotation, but not stretchable
  - Can rotate really weirdly (See super helix paper)
- Fixed at one end (scalp)

[State of the art] [Rather close look at it either by example or by concept] Approaches:

- Mesh rendering
  - Only simple mesh as hair
  - Simple and basically no performance impact
  - Useful for simple/small avatars (MOBAs, RTS, ...)
  - Not useful for realistic hair (What I want)
- Realistic/Physical rendering
  - TressFx, HairWorks, NumaDemo, Frostbyte engine...
  - Frameworks eher als Beispiel nehmen
  - What they do generally, with some optimizations here and there
  - Overview: Simulation, Interpolation, Rendering

- Simulation
  - Mass Spring systems:
    - Particle systems connected by springs
    - Needs multiple springs to make it realistic (curly etc.)
    - Good: Performance is ok
    - Bad: Hard to find spring constants / Hard to control
    - Is used
  - Super Helix simulation:
    - Very realistic
    - Performance not really good
    - Not used often because of performance
  - Collision:
    - Hair2Hair and Hair2Body Collision
    - Is possible with particles
    - Different approaches
    - Sphere collisions at particles
    - Penalty forces or just raw displacements
- Interpolation:
  - Single strand Interpolation
  - Multi strand interpolation
- Rendering:
  - Geometry:
    - Lines:
    - Simple and efficient
    - Only one width per render call
    - Hair gets thinner from base to leading end

        - Does not look to realistic
        - Triangles:
        - Have to be generated:
        - In Vertex shader with dummy verticies.
        - In Geometry shader with line strips.
        - In Tesselation shader with line strips or triangles from geometry shader.
        - If generated allow fine adjustments.
    * Shading:
        - Realistic light models exist (I have the paper, but can´t remember right now)
        - Deep opacity maps

[Knowledge for my simulation] [No maths, but explain the concept.] [Is rather easy explained with differential equations. This is also super easy implemented in a shader (<10 lines)] [It has a non differential solution which is faster and more accurate, but this is math porn. Maybe just write accept it or read it up.] Tractrix:

- What is a tractrix?
- Mathematical definition of it. (More graphical then mathematical)
- Attributes of a tractrix.
- Why try to use it?

[Knowledge for my rendering] Rendering:

- Don´t know yet. Maybe raytracing.
- I really have to look it up.

3 Contribution

Simulation:

Zielsetzung genau nennen

Auf related work aufbauen

- Tractrix simulation:
  - Benefits
    - Only math and little physics -> No search for spring constants
    - Rather straight forward O(n)
    - Possible to simulate B-Splines
      - Fewer points to simulate
  - My approaches:
    - Simple tractrix
    - Double tractrix (Forward + Backward)
    - Coupled with simple mass spring system
  - Evaluation

B-Spline structure:

- Fewer points for simulation
- How to manage collisions?
- How to render?

  - If no particles use ray tracing?

- Evaluation

Wenn Rendering nicht klappt, datenstruktur outputten und in offlinerender klatschen.

4 Implementation

Eckdaten der Implementierung

5 Conclusion

Vergleichbare Scenen suchen.

TressFX model ändern

Offline render in Maya o.Ä.

Problemfälle zeigen

Modeling wird schwer

Acronyms

API	Application Programming Interface
BDSG	Bundesdatenschutzgesetz
CEP	Complex Event Processing
DEA	Deterministischer endlicher Automat
EDA	Event Driven Architecture
GB	Gigabyte
GFS	Google File System
HDFS	Hadoop Distributed File System
HTTP	Hypertext Transfer Protocol
IDE	Integrated Development Environment
IP	Internetprotokoll
KB	Kilobyte
LTS	Long Term Support
MB	Megabyte
MPI	Message Passing Interface
MRC	Map Reduce Class
NAS	Network Attached Storage
NEA	Nichtdeterministischer endlicher Automat
NFS	Network File System
OS	Operating System
OSDI	Operating Systems Design and Implementations
PAP	Programmablaufplan
PDF	Portable Document Format
POM	Project Object Model
RFC	Request for Comments
RSA	Rivest, Shamir und Adleman
SAN	Storage Attached Network
SPOF	Single Point of Failure
SSH	Secure Shell
TMG	Telemediengesetz
VM	Virtuelle Maschine

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Bibliography

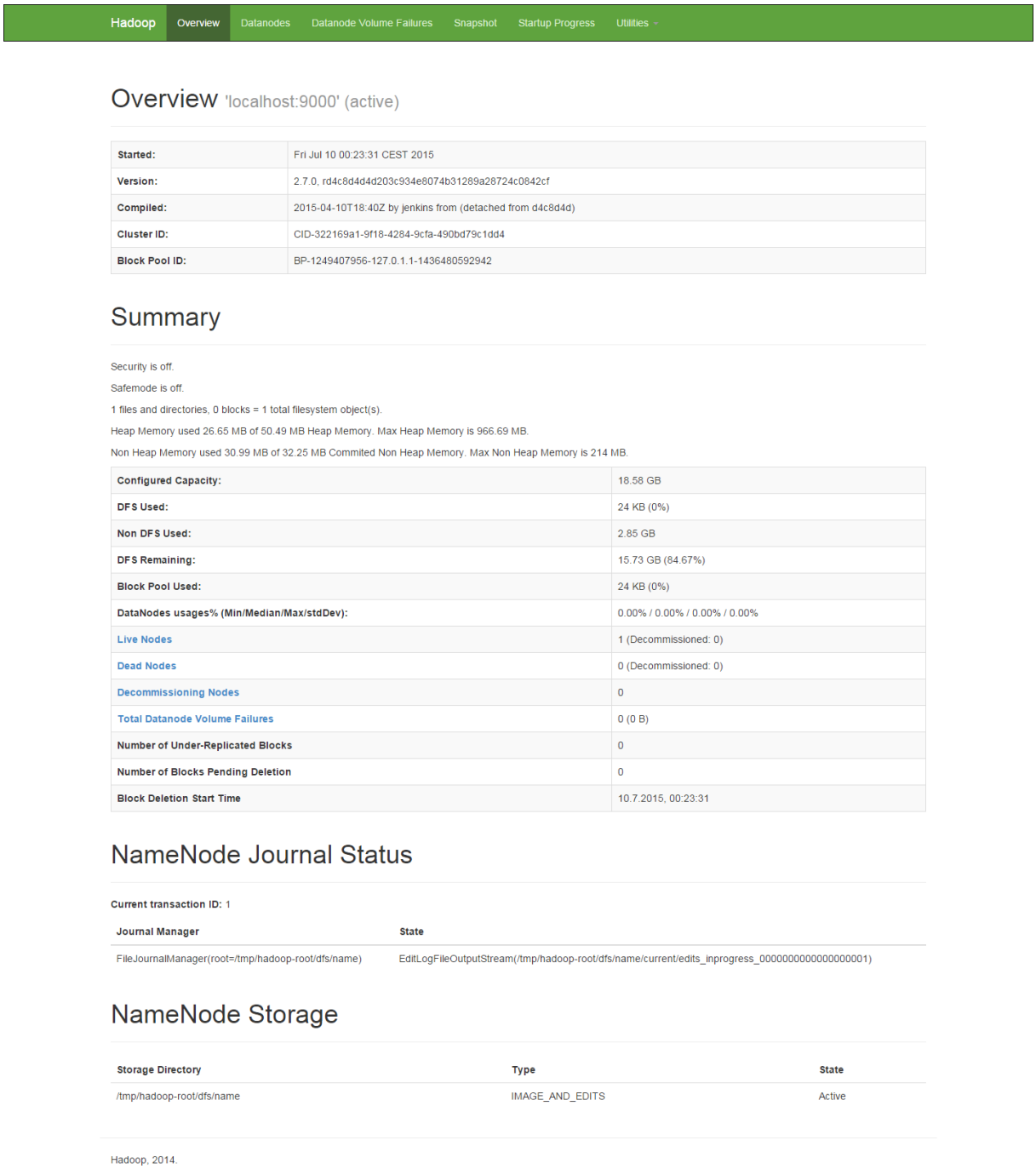
Appendix

A. Screenshot NameNode Web-Interface

B. DVD Inhalt

C. DVD

A. Screenshot NameNode Web-Interface



Hadoop | Overview | Datanodes | Datanode Volume Failures | Snapshot | Startup Progress | Utilities

Overview 'localhost:9000' (active)

Started:	Fri Jul 10 00:23:31 CEST 2015
Version:	2.7.0, rd4c8d4d4d203c934e8074b31289a28724c0842cf
Compiled:	2015-04-10T18:40Z by jenkins from (detached from d4c8d4d)
Cluster ID:	CID-322169a1-9f18-4284-9cfa-490bd79c1dd4
Block Pool ID:	BP-1249407956-127.0.1.1-1436480592942

Summary

Security is off.

Safemode is off.

1 files and directories, 0 blocks = 1 total filesystem object(s).

Heap Memory used 26.65 MB of 50.49 MB Heap Memory. Max Heap Memory is 966.69 MB.

Non Heap Memory used 30.99 MB of 32.25 MB Commited Non Heap Memory. Max Non Heap Memory is 214 MB.

Configured Capacity:	18.58 GB
DFS Used:	24 KB (0%)
Non DFS Used:	2.85 GB
DFS Remaining:	15.73 GB (84.67%)
Block Pool Used:	24 KB (0%)
DataNodes usages% (Min/Median/Max/stdDev):	0.00% / 0.00% / 0.00% / 0.00%
Live Nodes	1 (Decommissioned: 0)
Dead Nodes	0 (Decommissioned: 0)
Decommissioning Nodes	0
Total Datanode Volume Failures	0 (0 B)
Number of Under-Replicated Blocks	0
Number of Blocks Pending Deletion	0
Block Deletion Start Time	10.7.2015, 00:23:31

NameNode Journal Status

Current transaction ID: 1

Journal Manager	State
FileJournalManager(root=/tmp/hadoop-root/dfs/name)	EditLogFileOutputStream(/tmp/hadoop-root/dfs/name/current/edits_inprogress_0000000000000000001)

NameNode Storage

Storage Directory	Type	State
/tmp/hadoop-root/dfs/name	IMAGE_AND_EDITS	Active

Hadoop, 2014.

C. DVD Inhalt

```
├ Anwendung/
|    – pom-xml                                  ⇒ Maven POM Datei
|    ├ conf/                                    ⇒ *.properties Dateien für Konfiguration
|    ├ src/                                     ⇒ Quellcode Dateien
|    ├ target/
|    |    – Logfileanalyzer-1.0-SNAPSHOT.jar    ⇒ Ausführtbare JAR-Datei
|    |    ├ site/apidocs/                       ⇒ JavaDoc für Browser
|
├ Literatur/                                     ⇒ PDF Literatur & E-Books
├ Praesentationen/
|    – Abschlusspraesentation.pptx              ⇒ Präsentation vom 21. August 2015
|    – Abschlusspraesentation.pdf
|    – Kickoffpraesentation.pptx                ⇒ Präsentation vom 03. Juni 2015
|    – Kickoffpraesentation.pdf
|
├ Sonstiges/
|    – LineareRegression.xlsx                   ⇒ Berechnung der linearen Regression
|
├ Latex-Files/                                   ⇒ Editierbare LaTeX Dateien der Arbeit
     – bibliographie.bib                        ⇒ Literaturverzeichnis
     – dokumentation.pdf                        ⇒ Bachelorarbeit als PDF
     – dokumentation.tex                        ⇒ Hauptdokument
     – einstellungen.tex                        ⇒ Einstellungen
     ├ ads/                                     ⇒ Header, Glosar, Abkürzungen, etc.
     ├ content/                                 ⇒ Kapitel
     ├ images/                                  ⇒ Bilder
     ├ lang/                                    ⇒ Sprachdateien für LaTeX Template
```