Software Source Code Interest Group

Introduction

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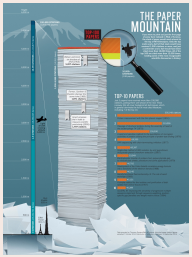
Software Heritage

THE GREAT LIBRARY OF SOURCE CODE

Why we are here

Software is *an essential component* of modern scientific research



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> *[…] the vast majority describe experimental methods or sofware that have become essential in their fields.*

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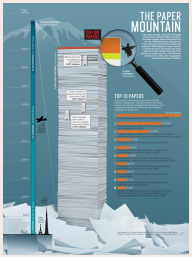

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The *source code* is essential

- it contains the *real knowledge*,
- it is currently poorly accounted for

Reminder: the *source code* of a software artefact

“The source code for a work means the preferred form of the work for making modifications to it."

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Hello World
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Hello World

Program (excerpt of binary)

```
4004e6: 55
4004e7: 48 89 e5
4004ea: bf 84 05 40 00
4004ef: b8 00 00 00 00
4004f4: e8 c7 fe ff ff
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Program (source code)

```
/* Hello World program */

#include<stdio.h>

void main()
{
    printf("Hello World");
}
```

R1: Software Source Code is *special*

Harold Abelson, Structure and Interpretation of Computer Programs

"Programs must be written for people to read, and only incidentally for machines to execute."

Quake 2 source code (excerpt)

```
float Q_rsqrt( float number )
{
    long i;
    float x2, y;
    const float threehalfs = 1.5F;

    x2 = number * 0.5F;
    y = number;
    i = * ( long * ) &y; // evil floating point bit level hacking
    i = 0x5f3759df - ( i >> 1 ); // what the fuck?
    y = * ( float * ) &i;
    y = y * ( threehalfs - ( x2 * y * y ) ); // 1st iteration
// y = y * ( threehalfs - ( x2 * y * y ) ); // 2nd iteration, this
can be removed

    return y;
}
```

Net. queue in Linux (excerpt)

```
/*
 * SFB uses two B[l][n] : L x N arrays of bins (L levels, N bins per level)
 * This implementation uses L = 8 and N = 16
 * This permits us to split one 32bit hash (provided per packet by rxhash or
 * external classifier) into 8 subhashes of 4 bits.
 */
#define SFB_BUCKET_SHIFT 4
#define SFB_NUMBUCKETS  (1 << SFB_BUCKET_SHIFT) /* N bins per Level */
#define SFB_BUCKET_MASK (SFB_NUMBUCKETS - 1)
#define SFB_LEVELS      (32 / SFB_BUCKET_SHIFT) /* L */

/* SFB algo uses a virtual queue, named "bin" */
struct sfb_bucket {
        u16             qlen; /* length of virtual queue */
        u16             p_mark; /* marking probability */
};
```

Len Shustek, Computer History Museum

"Source code provides a view into the mind of the designer."

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executable and *human readable* knowledge (an *all time new*)

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Bottomline: software source code _is not just another_ sequence of bits

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No universal archive

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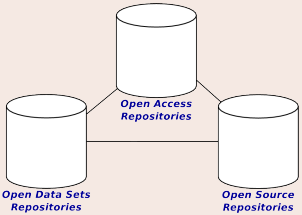
The Knowledge Conservancy Magic Triangle



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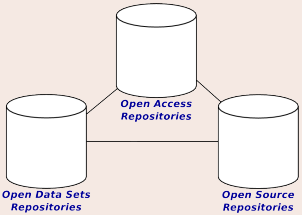

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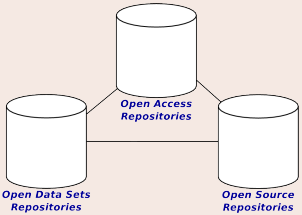

- Articles: HAL, ArXiv, 100s of inst. repositories
- Data: Zenodo, Figshare, 100s of various repositories
- Software:
  - R4: GitHub does not fit the bill
  - R5: we want to avoid duplication of efforts

RDA is a good place for starting the conversation on...

Metadata

- what kind of *ontology* exist for software?
- what would be appropriate for Source Code?

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- citation
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Relation to professional software development

- is scientific software different from, say, usual open source software?
- can we learn from the experience of millions of open source developers?

Objectives and Agenda

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- metadata frameworks for source code
  - analyze and identify gaps
- collect use cases

Agenda

1. Introduction (done)
2. Overview of metadata frameworks for source code
3. Parallel discussion and gap identification
4. Collection of potential use cases
5. Summary of results and wrap up

Reminder

RDA SCIG page

https://www.rd-alliance.org/groups/software-source-code-ig

Working document used during the session

https://bit.ly/RDA10SoftwareIGNotes