



Introduction

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MPI-AEI



Author's name



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- Installation
- Hello Cruel World
- GAT Object Model
- File Management
- FileStream Management
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- Advert Management
- Job Management
- Endtroduction

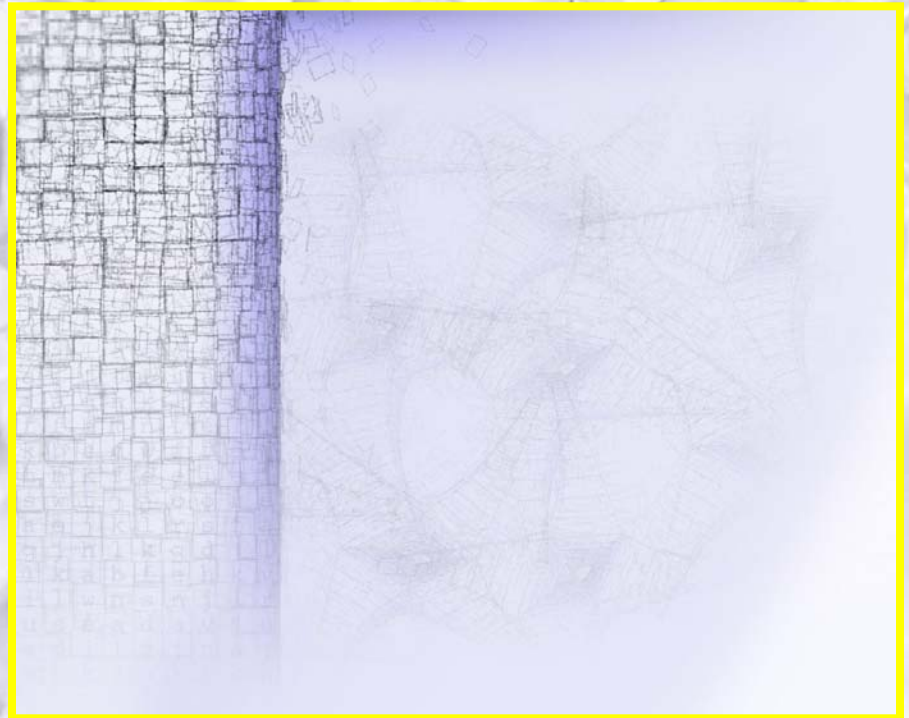


Introduction: Outline



Information Society
Technologies

- Speaker Background
- GridLab Background

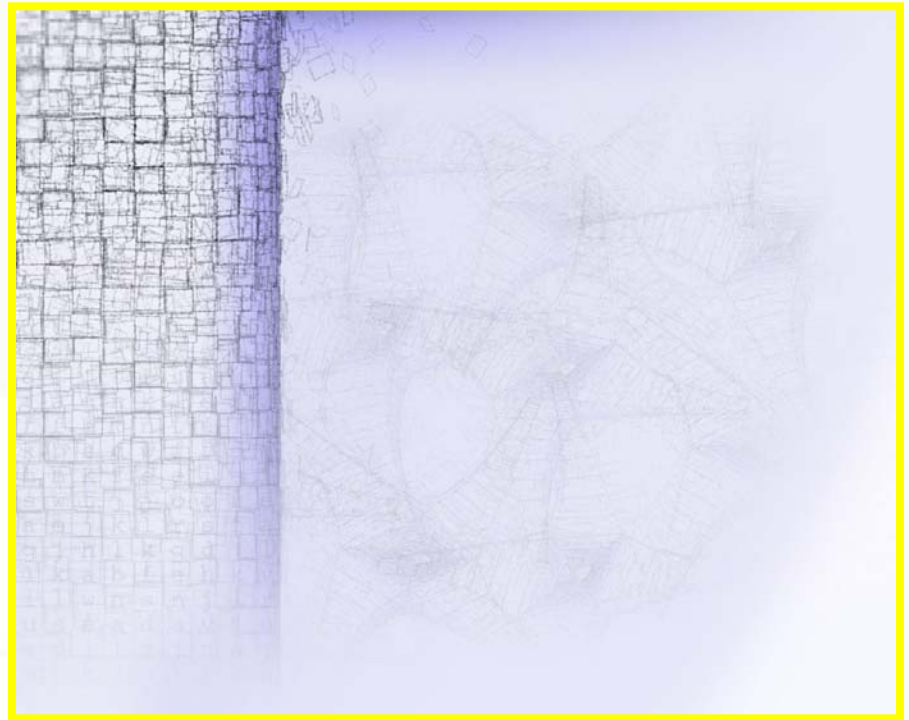




Speaker Background



- High energy theoretical particle physicist
- Spent a number of years in software industry
- Joined the GridLab project two years ago





GridLab Background



- EU Project Funded by 5th Framework
 - PSNC, AEI, ZIB, MASARYK, SZTAKI
 - ISUFI, Cardiff, NTUA, Chicago, ISI
 - Wisconsin, Sun, Compaq,...

- 12 Work Packages covering
 - Grid Portals
 - Mobile Users
 - Grid Services
 - Applications
 - Testbed
 - **GAT: Grid Application Toolkit**





Why GAT?

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Why GAT?: Outline



- What is GAT?
- Why GAT?
- What can GAT do?
 - File Management
 - FileStream Management
 - LogicalFile Management
 - Advert Management
 - Job Management
 - Monitoring
 - And more...



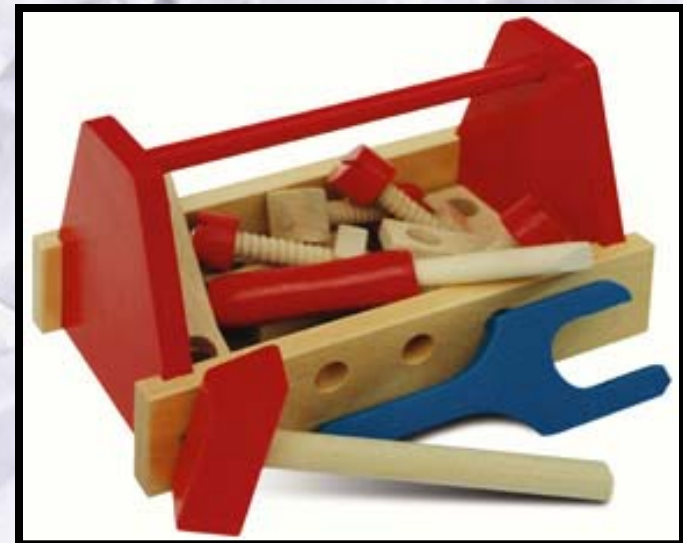
What is **GAT**?



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GAT is...?

...an API and toolkit for developing and running portable grid apps independently of the underlying grid infrastructure and available services



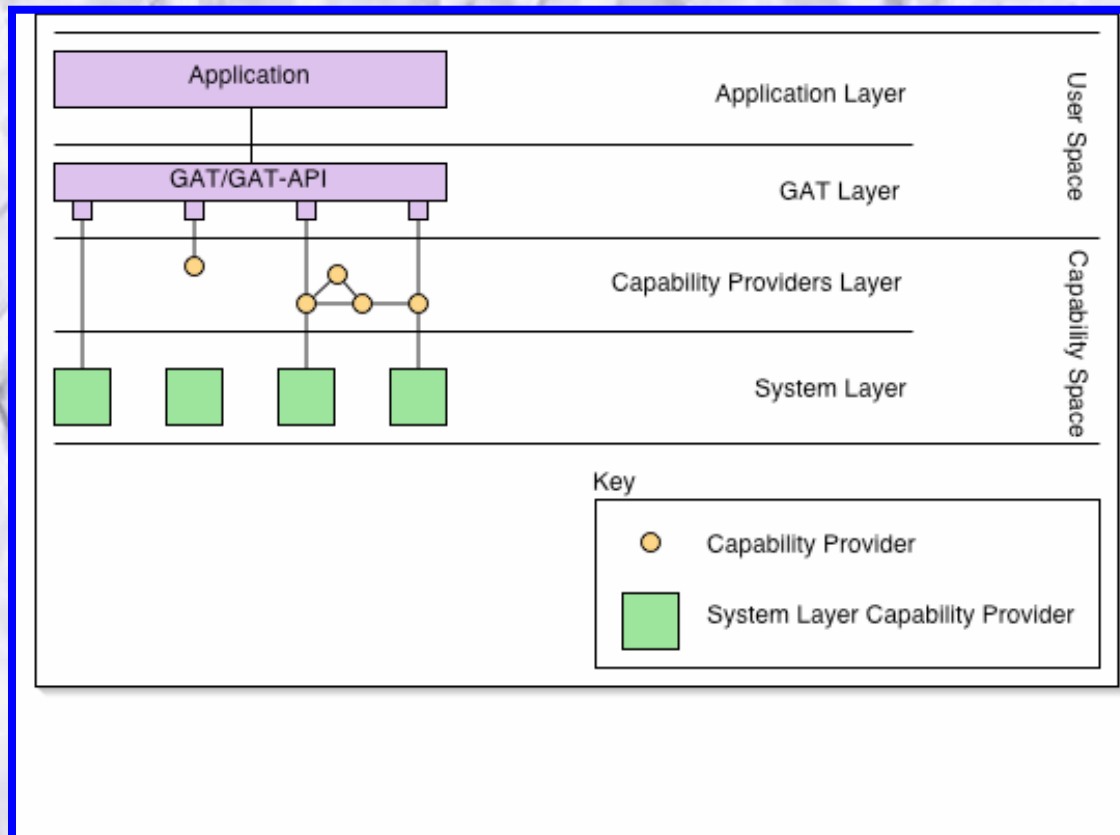


What is GAT?



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Technologies

GAT is...?





Why **GAT**?



"It's in there!"

RFT

OGSA

globus



The Grid

unicore

wsdl

...and more



Why **GAT**?



.....simplicity

Author's name



What can GAT Do?



- File Management
 - Move Files
 - Copy Files
 - Delete Files
 - Examine File Properties
 - ...and more

...all in a manner independent of the file's location or method of access!





What can **GAT** Do?



● FileStream Management

- Read Bytes from a File
- Write Bytes to a File
- Seek on a File
- ...and more

...in such a ways as to lift the burden of protocols, security, and other details from the user's shoulders!



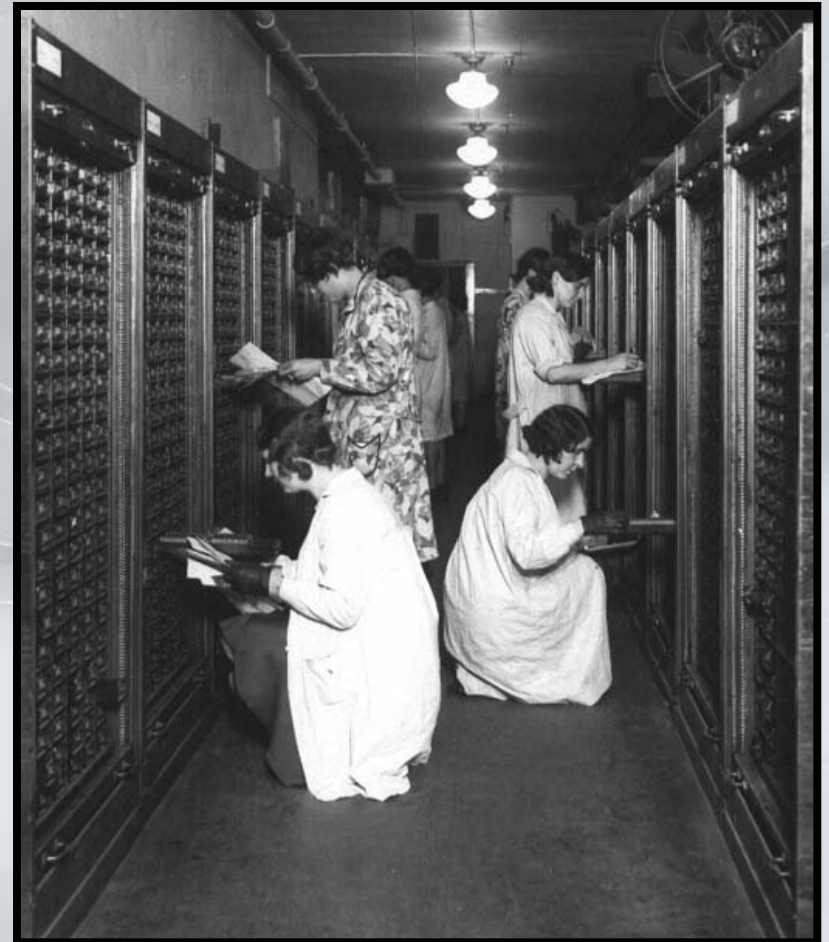


What can **GAT** Do?



- LogicalFile Management
 - Replicates files
 - ...and more

...so as to maximize use of available network bandwidth and never have to worry about the details of security, protocols, Globus...





What can GAT Do?



● Advert Management

- Persist objects
- Query for persisted objects
- Move objects across machine boundaries
- Move objects across language boundaries
- ...and more



...so as to never yoke the application programmer with the details. It just works!



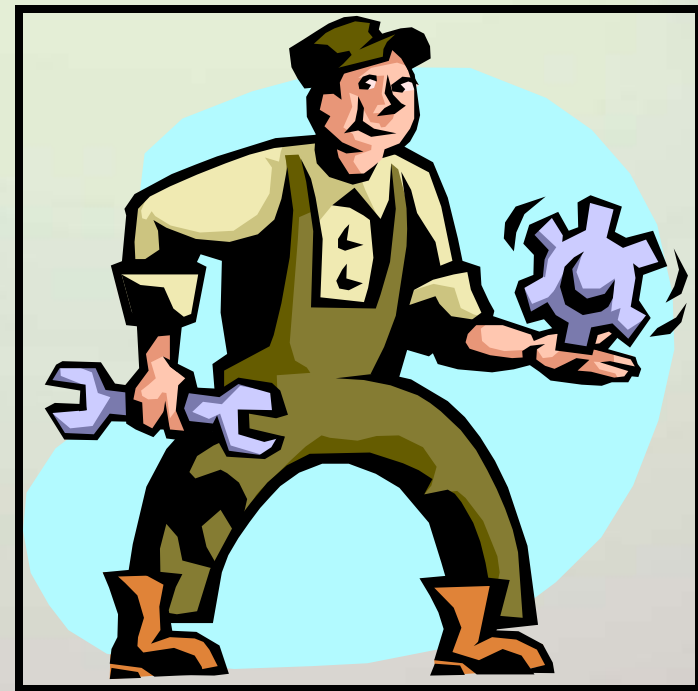
What can **GAT** Do?



● Job Management

- Schedule Jobs
- Un-Schedule Jobs
- Stop Jobs
- Checkpoint Jobs
- Migrate Jobs
- ...and more

...while not bothering the user with the details of traditional job management systems such as Condor, Globus, Unicore...





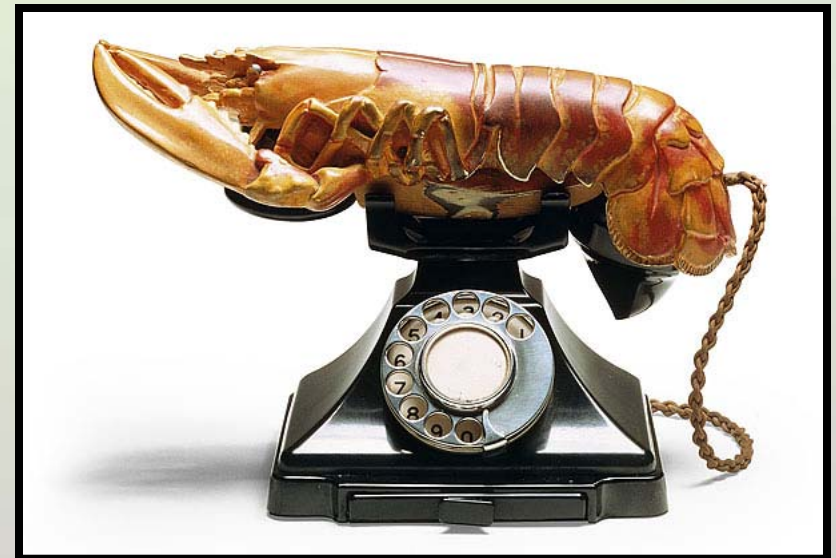
What can **GAT** Do?



● Monitoring

- Monitor almost anything
- Monitor continuous events
- Monitor “event-like” events
- Allows GAT application to be monitored
- ...and more

...while the user never needs to know the details of Mercury, NWS, or any other monitoring system.



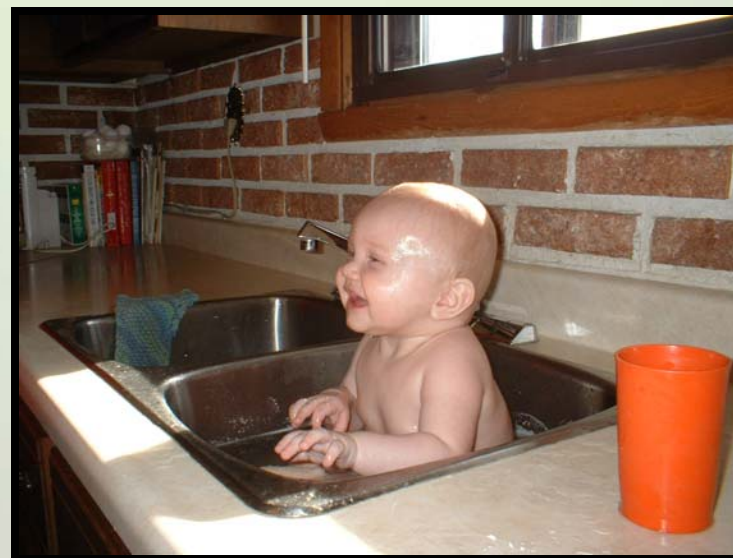


What can GAT Do?



● ...and More

- Explore Resources on "The Grid"
- Obtain Resource Reservations
- Instrument GAT Applications for Checkpointing
- Communicate -- socket-like -- between processes
- "Everything, *including* the Kitchen Sink"



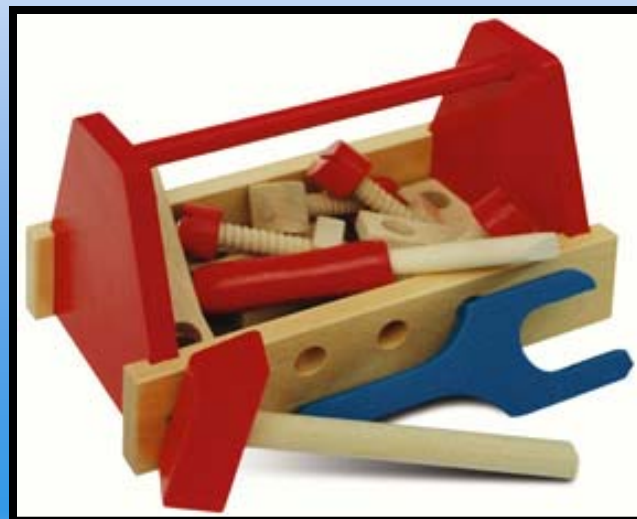


GATObject Model

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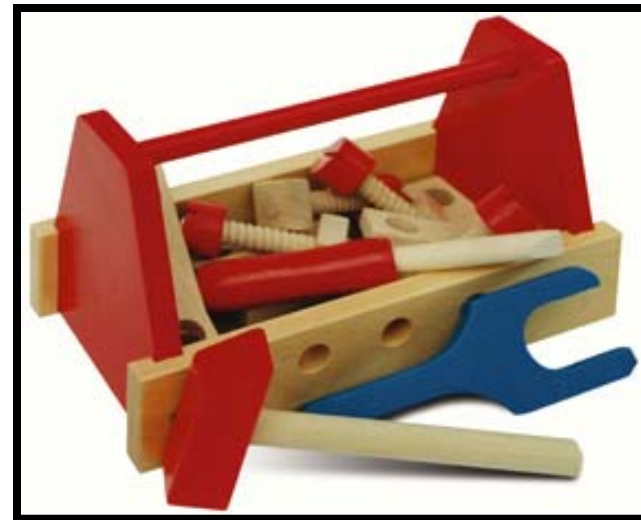
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GATObject Model: Outline



- C ain't OO
- GAT Object Model
- GAT Interface Model
- Examples
 - Getting an object's GATType
 - Determining object equality
- GAT Core Objects

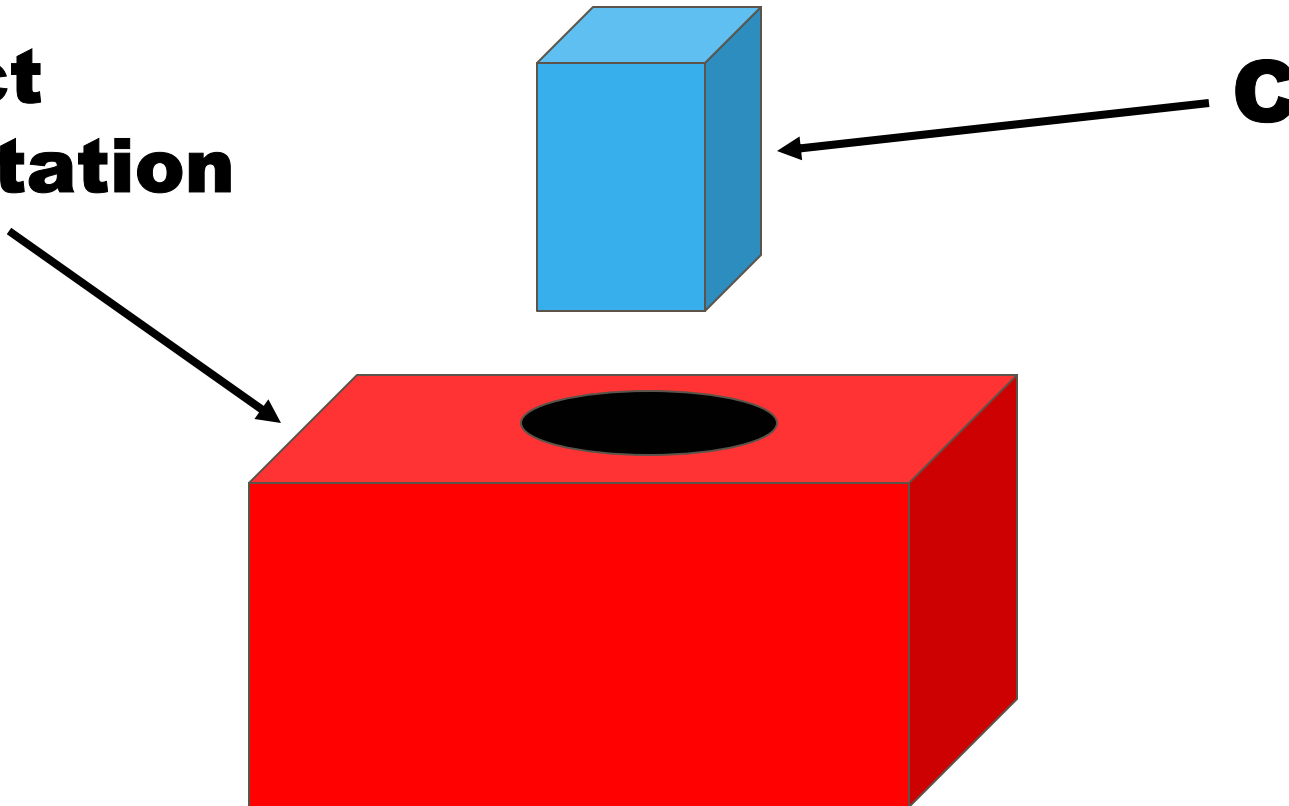




C ain't Object Oriented



**Object
Orientation**



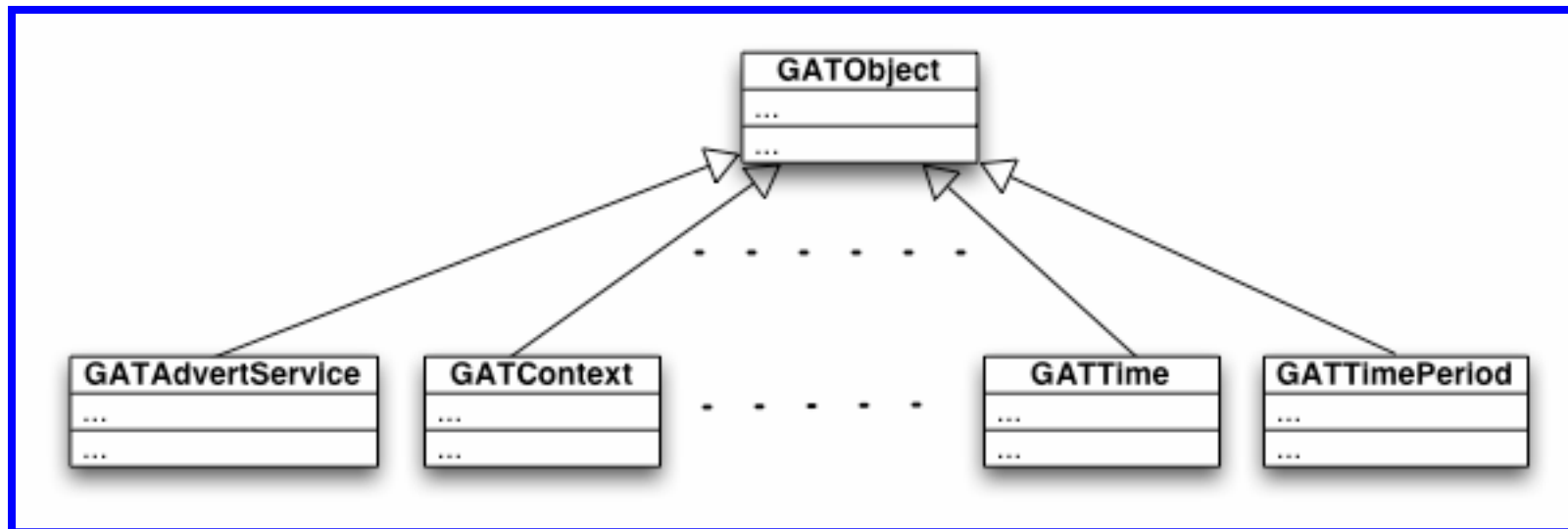
"Square Peg in a Round Hole"



GAT Object Model



The GAT "inheritance" tree...





GAT Object Model



The *GATObject* ...

GATObject

...

```
GATType GATObject_GetType(GATObject_const object)
```

```
void GATObject_Destroy(GATObject *object)
```

```
GATResult GATObject_Equals(GATObject_const lhs, GATObject_const rhs, GATBool *isequal)
```

```
GATResult GATObject_Clone(GATObject_const object, GATObject *result)
```

```
GATResult GATObject_GetInterface(GATObject_const object, GATInterface iftype, void const **ifp)
```



GAT Object Model



GATObject_GetType

GATObject	
...	
GATType	GATObject_GetType(GATObject_const object)
void	GATObject_Destroy(GATObject *object)
GATResult	GATObject_Equals(GATObject_const lhs, GATObject_const rhs, GATBool *isequal)
GATResult	GATObject_Clone(GATObject_const object, GATObject *result)
GATResult	GATObject_GetInterface(GATObject_const object, GATInterface iftype, void const **ifp)



GAT Object Model



GATObject_Destroy

GATObject

...

```
GATType GATObject_GetType(GATObject_const object)
void GATObject_Destroy(GATObject *object)
GATResult GATObject_Equals(GATObject_const lhs, GATObject_const rhs, GATBool *isequal)
GATResult GATObject_Clone(GATObject_const object, GATObject *result)
GATResult GATObject_GetInterface(GATObject_const object, GATInterface iftype, void const **ifp)
```



GAT Object Model



GATObject_Equals

GATObject

...

GATType GATObject_GetType(GATObject_const object)

void GATObject_Destroy(GATObject *object)

GATResult GATObject_Equals(GATObject_const lhs, GATObject_const rhs, GATBool *isequal)

GATResult GATObject_Clone(GATObject_const object, GATObject *result)

GATResult GATObject_GetInterface(GATObject_const object, GATInterface iftype, void const **ifp)



GAT Object Model



GATObject_Clone

```
GATObject  
...  
GATType GATObject_GetType(GATObject_const object)  
void GATObject_Destroy(GATObject *object)  
GATResult GATObject_Equals(GATObject_const lhs, GATObject_const rhs, GATBool *isequal)  
GATResult GATObject_Clone(GATObject_const object, GATObject *result)  
GATResult GATObject_GetInterface(GATObject_const object, GATInterface iftype, void const **ifp)
```



GAT Object Model



GATObject_GetInterface

GATObject

...

GATType GATObject_GetType(GATObject_const object)

void GATObject_Destroy(GATObject *object)

GATResult GATObject_Equals(GATObject_const lhs, GATObject_const rhs, GATBool *isequal)

GATResult GATObject_Clone(GATObject_const object, GATObject *result)

GATResult GATObject_GetInterface(GATObject_const object, GATInterface iftype, void const **ifp)



GAT Object Model



Example: *GATTime*...

```
GATTime  
...  
GATType GATTime_GetType(GATTime_const tim)  
void GATTime_Destroy(GATTime *tim)  
GATResult GATTime_Equals(GATTime_const lhs, GATTime_const rhs, GATBool *isequal)  
GATResult GATTime_Clone(GATTime_const tim, GATTime *thisClone)  
GATResult GATTime_GetInterface(GATTime_const object, GATInterface iftype, void const **ifp)  
...
```



GAT Object Model



GATObject casting functions...

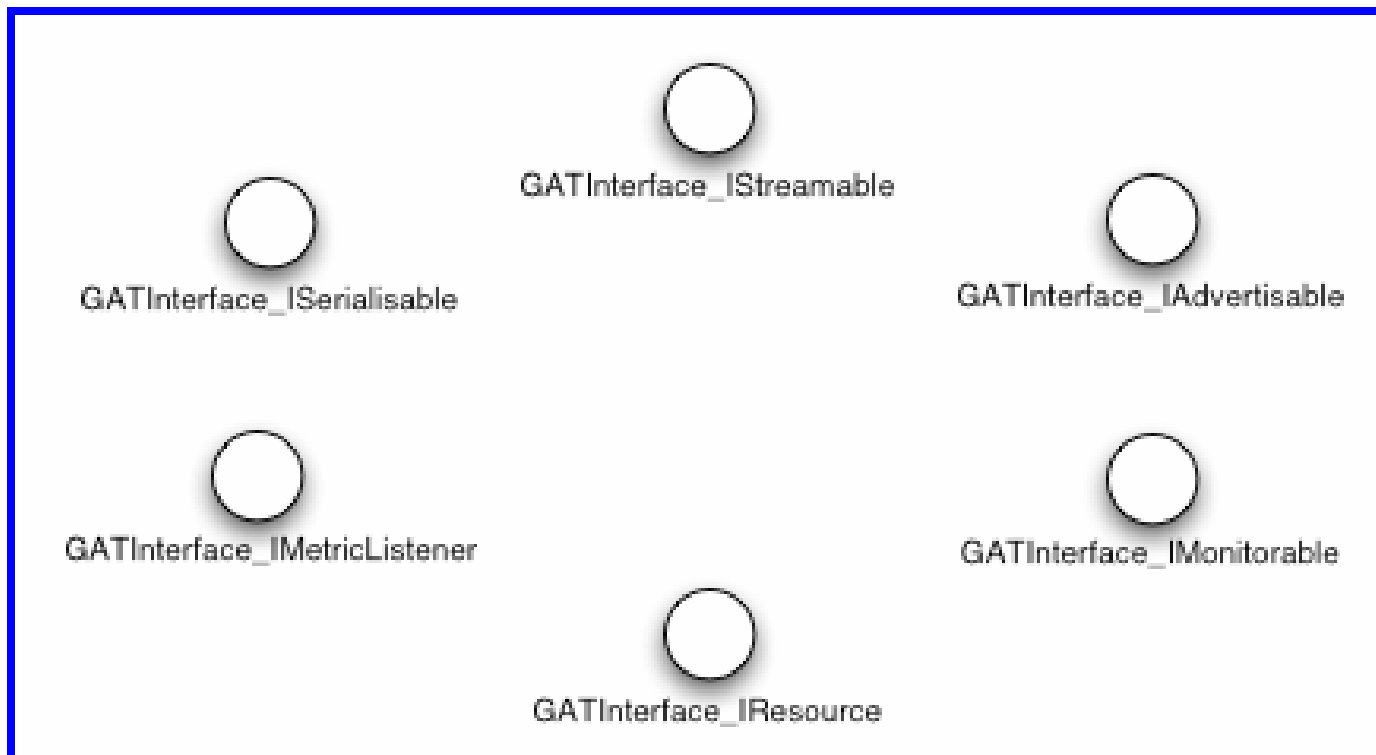
```
GATTime GATObject_ToGATTime(GATObject object)
GATObject GATTime_ToGATObject(GATTime derived)
GATTime_const GATObject_ToGATTime_const(GATObject_const object)
GATObject_const GATTime_ToGATObject_const(GATTime_const derived)
```



GAT Interface Model



GAT interfaces...



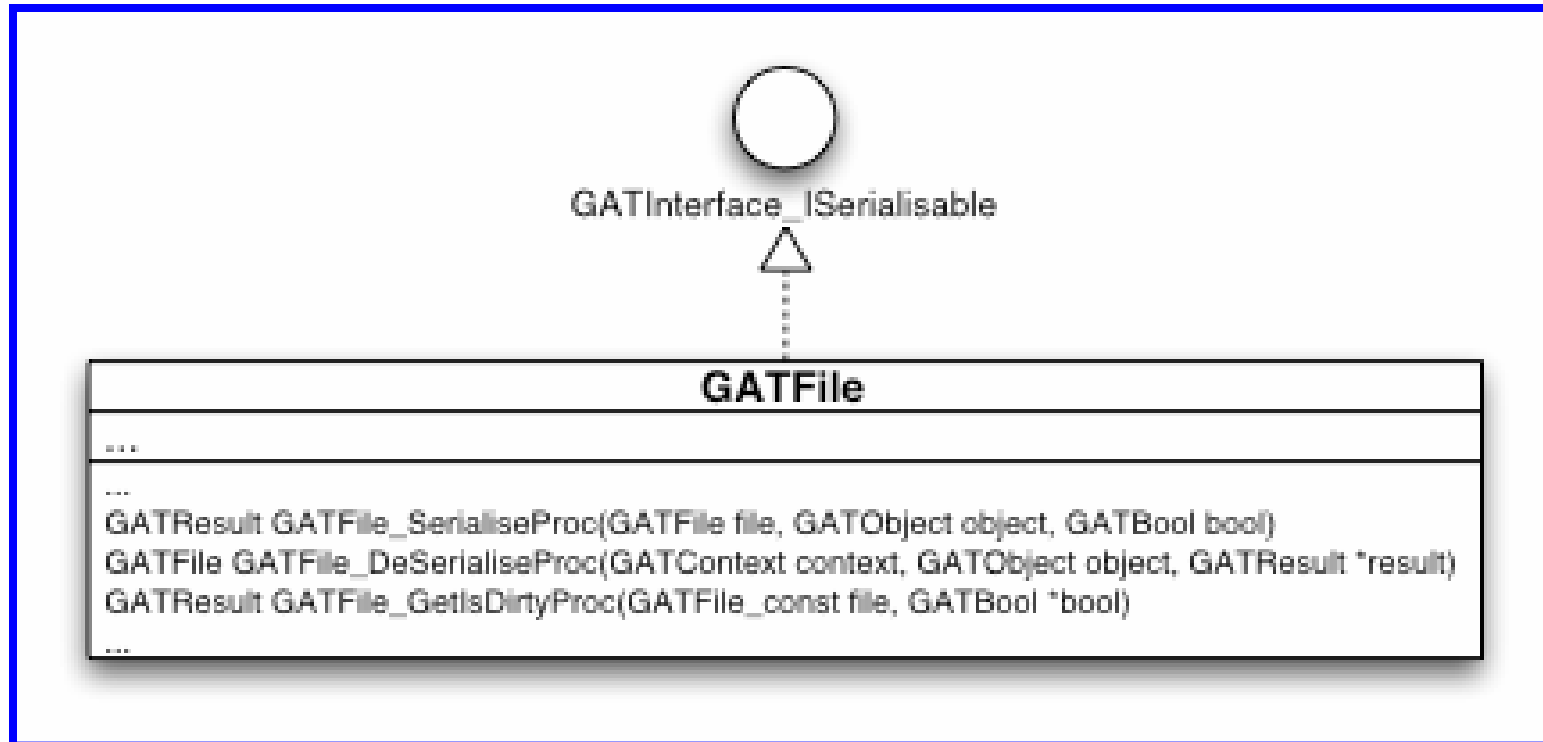
Author's name



GAT Interface Model



Example: *GATFile*...



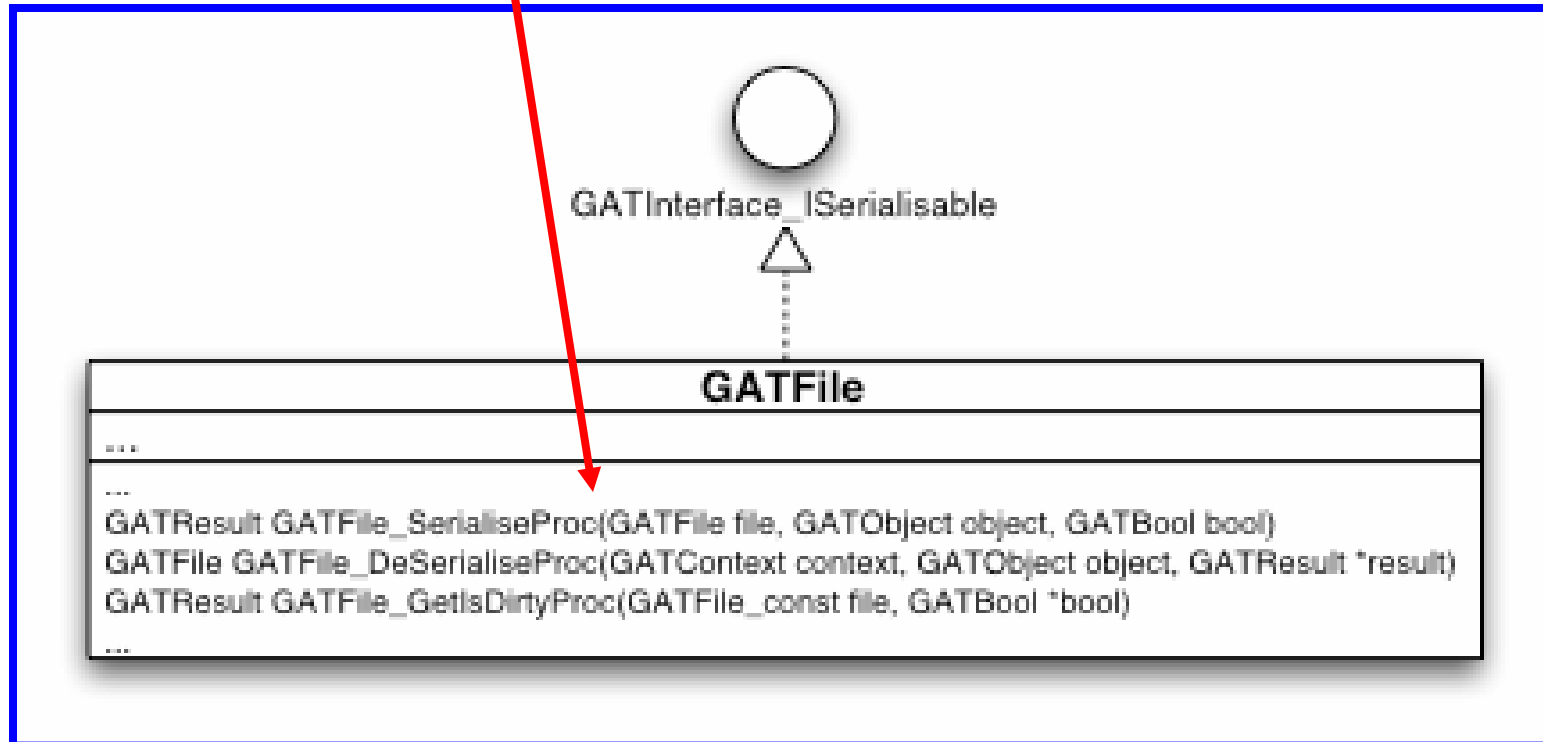
Author's name



GAT Interface Model

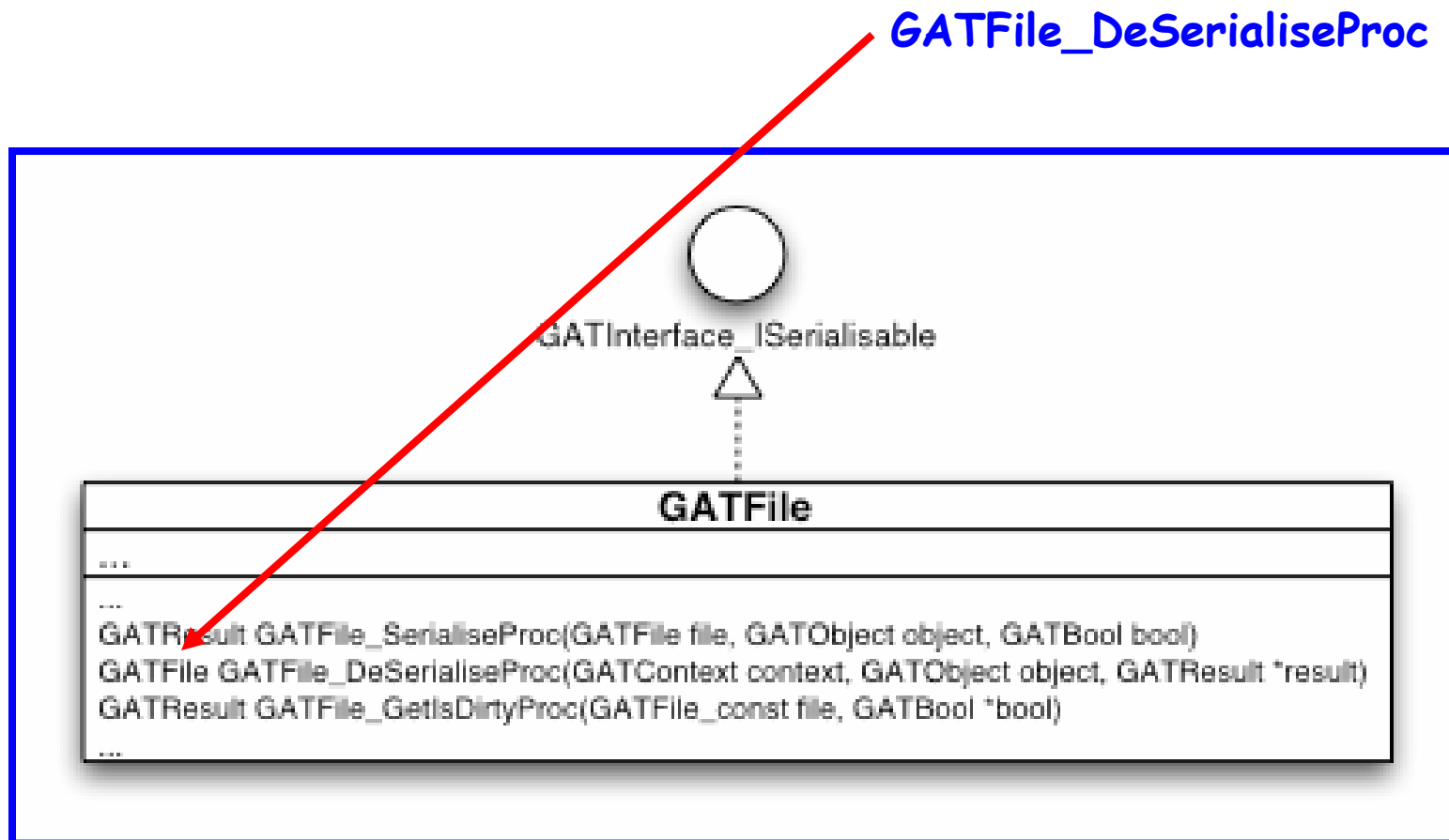


GATFile_SerialiseProc





GAT Interface Model

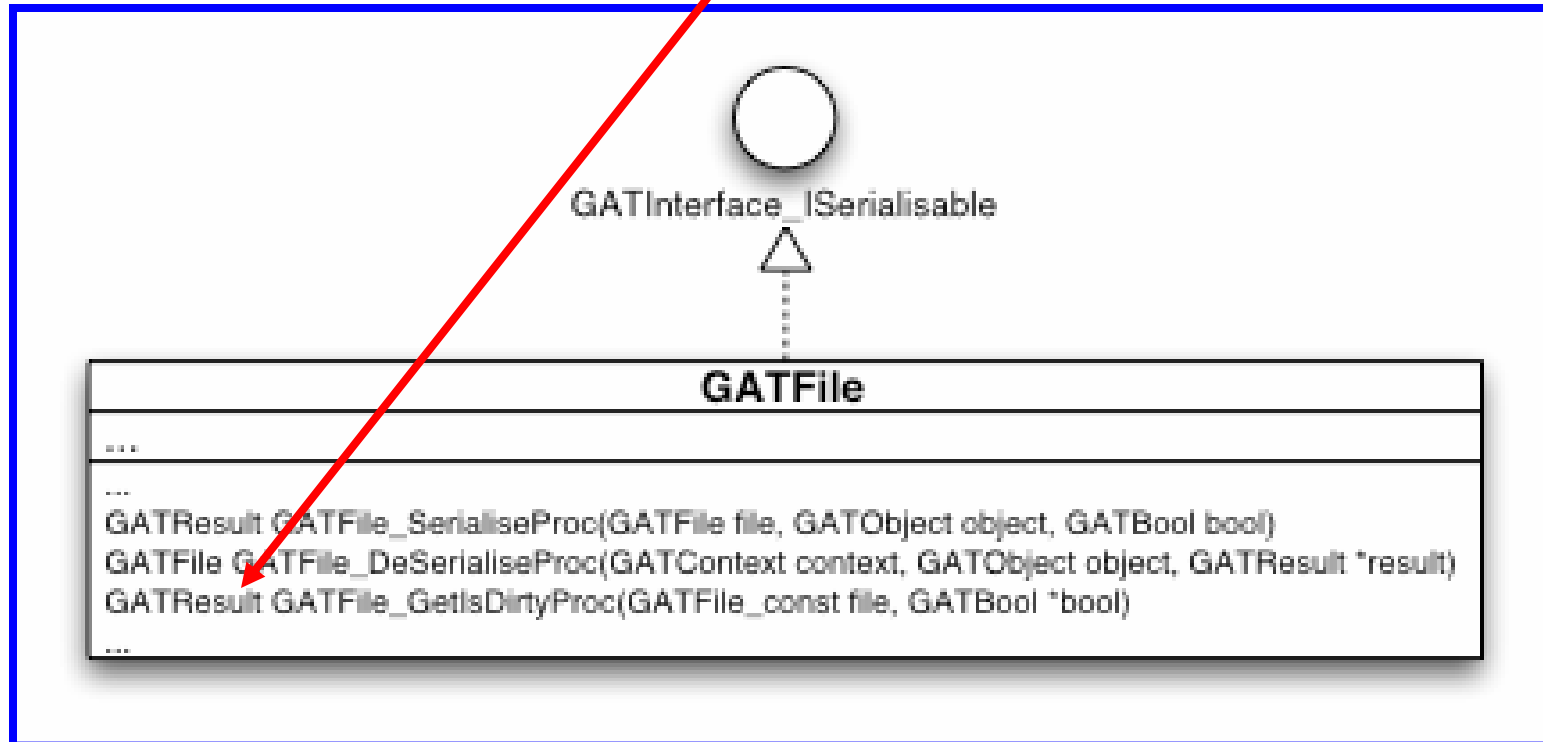




GAT Interface Model



GATFile_GetIsDirty





Examples...



● Getting an Object's Type

```
#include "GAT.h"

int main(void)
{
    GATType type;
    GATTime time;

    /* Create a GATTime corresponding to now */
    time = GATTime_Create(0);

    /* Obtain the GATType of the GATTime time */
    if( NULL != time )
    {
        type = GATTime_GetType(time);

        /* Destroy the GATTime time */
        GATTime_Destroy( &time );
    }

    return 0;
}
```

Here's the action!

Author's name



Examples...



● Determining Object Equality

```
...
/* Determine semantic equivalence of timeOne and timeTwo */
if( (NULL != timeOne) && (NULL != timeTwo) )
{
    result = GATTime_Equals( timeOne, timeTwo, &isequal );
    if( GAT_SUCCEEDED( result ) )
    {
        if( GATTrue == isequal )
        {
            printf( "timeOne and timeTwo are semantically
equivalent\n" );
        }
        else
        {
            printf( "timeOne and timeTwo are not semantically
equivalent\n" );
        }
    }
}
}
...

```

Here's the equals



Core Objects



● GATPreferences

Purpose: To contain user preference info

GATPreferences
...
...
GATResult GATPreferences_Add(GATPreferences, const char *, const char *)
GATResult GATPreferences_Remove(GATPreferences, const char *)
..



Core Objects



● GATContext

Purpose: To centralize a *GAT* user's state information

GATContext
...
...
GATResult GATContext_AddPreferences(GATContext, GATPreferences_const)
GATResult GATContext_RemovePreferences(GATContext)
GATPreferences_const GATContext_GetPreferences(GATContext_const)
GATResult GATContext_ServiceActions(GATContext, GATTimePeriod_const)
...



Core Objects



● GATContext

Purpose: To centralize a GAT user's state information

Preferences Functions

```
GATContext
...
...
GATResult GATContext_AddPreferences(GATContext, GATPreferences_const)
GATResult GATContext_RemovePreferences(GATContext)
GATPreferences_const GATContext_GetPreferences(GATContext_const)
GATResult GATContext_ServiceActions(GATContext, GATTimePeriod_const)
...
```




Core Objects



● GATContext

Purpose: To centralize a GAT user's state information

Service actions

GATContext
...
...
GATResult GATContext_AddPreferences(GATContext, GATPreferences_const)
GATResult GATContext_RemovePreferences(GATContext)
GATPreferences_const GATContext_GetPreferences(GATContext_const)
GATResult GATContext_ServiceActions(GATContext, GATTimePeriod_const)
...



Core Objects



● GATLocation

Purpose: To represent a URI

```
GATLocation  
...  
...  
GATLocation GATLocation_Create(const char *)  
GATResult GATLocation_GetScheme(GATLocation_const, GATString *)  
GATResult GATLocation_GetPort(GATLocation_const, int *)  
...
```



Core Objects



● GATLocation

Purpose: To represent a URI

Creation

GATLocation
...
...
GATLocation GATLocation_Create(const char *)
GATResult GATLocation_GetScheme(GATLocation_const, GATString *)
GATResult GATLocation_GetPort(GATLocation_const, int *)
...



Core Objects



● GATLocation

Purpose:

To represent a URI

Getters

...

```
GATLocation
...
...
GATLocation GATLocation_Create(const char *)
GATResult GATLocation_GetScheme(GATLocation_const, GATString *)
GATResult GATLocation_GetPort(GATLocation_const, int *)
...
```



Core Objects



● GATTime

Purpose: To represent an instant in time

GATTime
...
...
GATTime GATTime_Create(GATdouble64) GATdouble64 GATTime_GetTime(GATTime_const)
...



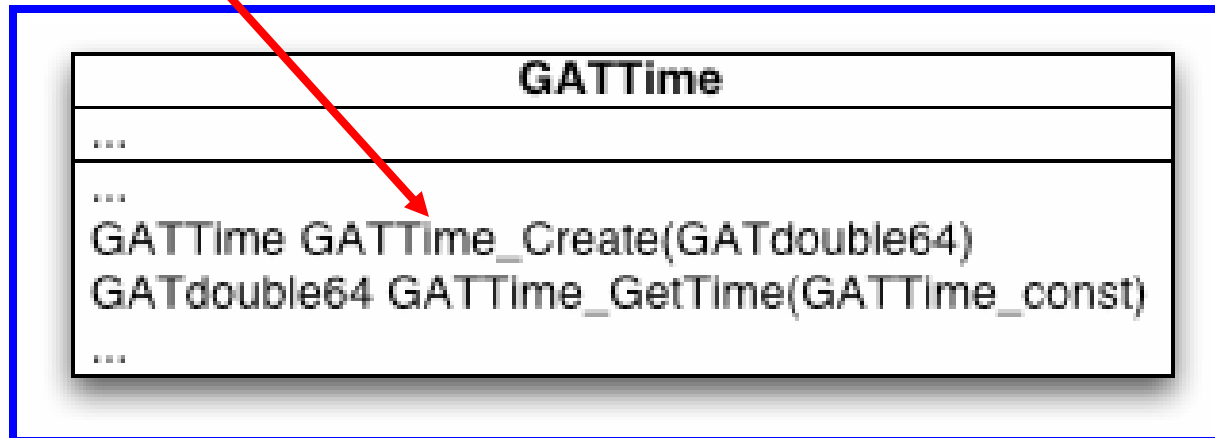
Core Objects



● GATTime

Purpose: To represent an instant in time

Creation (Seconds after 00:00 hours, Jan 1, 1970 UTC)





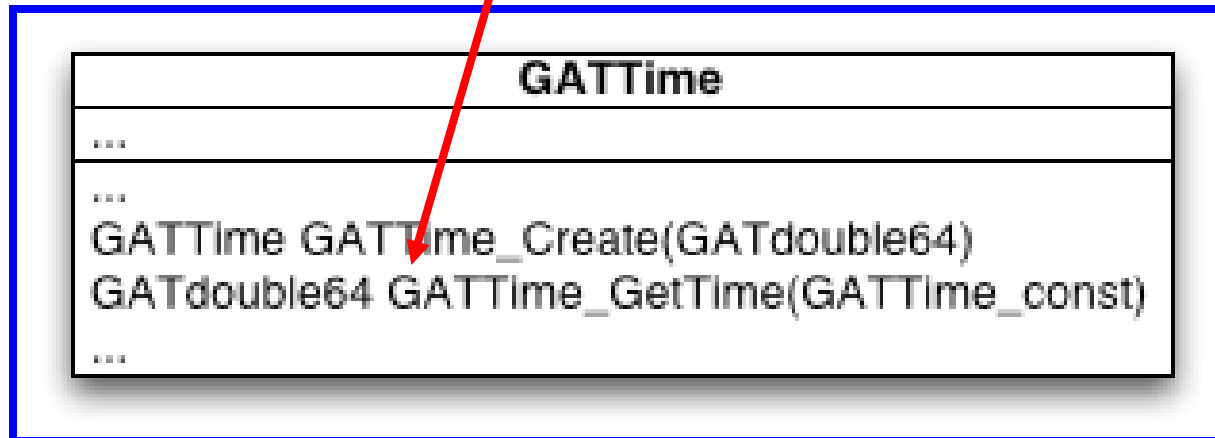
Core Objects



● GATTime

Purpose: To represent an instant in time

Getter





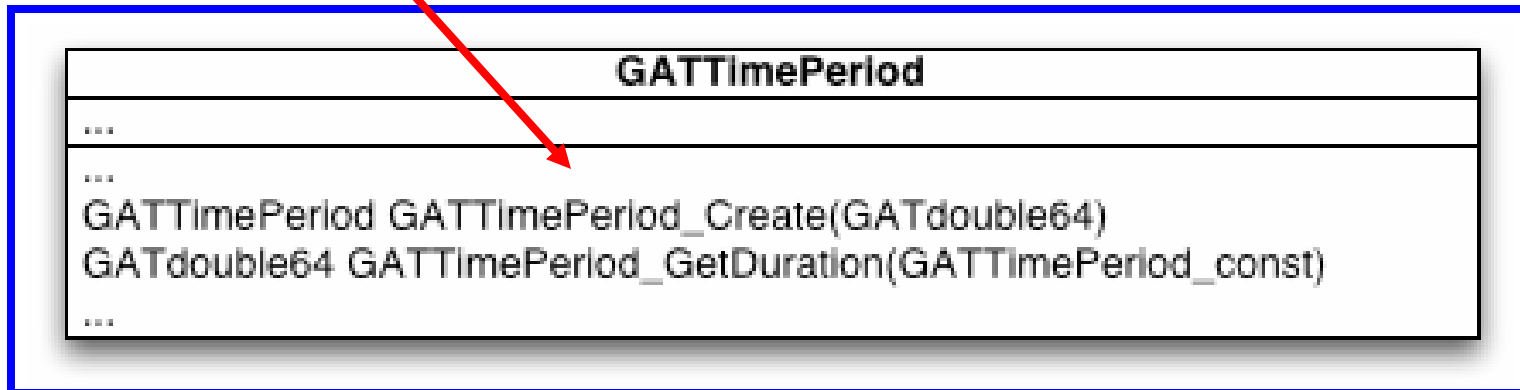
Core Objects



● GATTimePeriod

Purpose: To represent a time duration

Creation (Duration in Seconds)





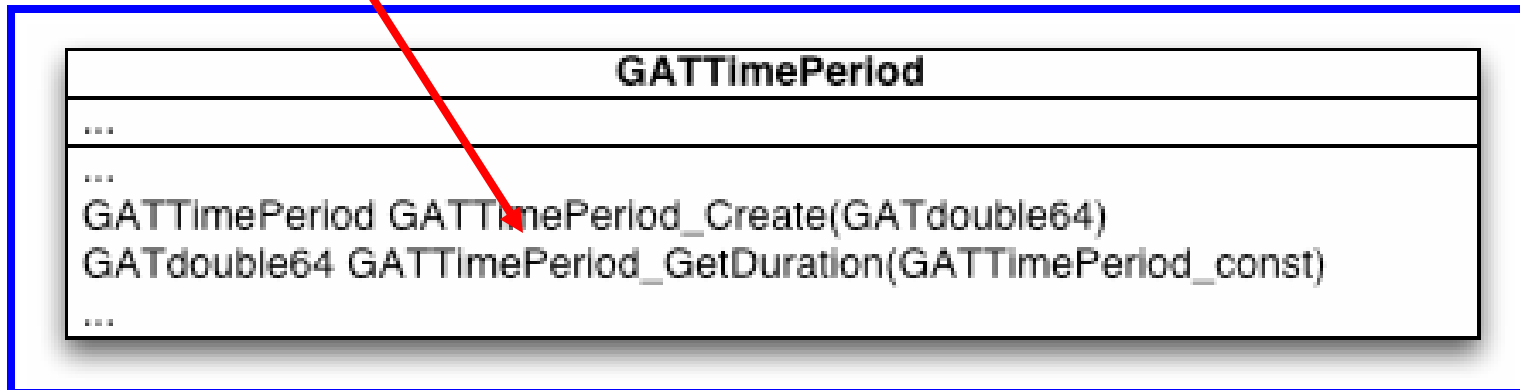
Core Objects



● GATTimePeriod

Purpose: To represent a time duration

Getter





Installation

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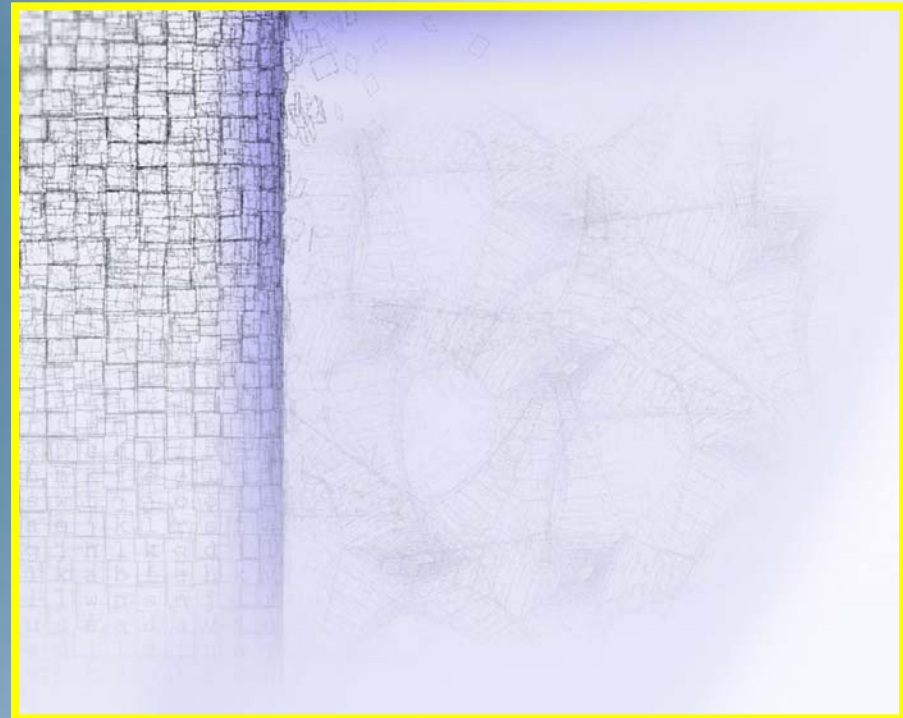
Author's name



Installation: Outline



- Download, configure.
make, make install
- Set Environment
- Test





Installation



Information Society
Technologies

- Download, configure, make, make install...

Don't worry about it...



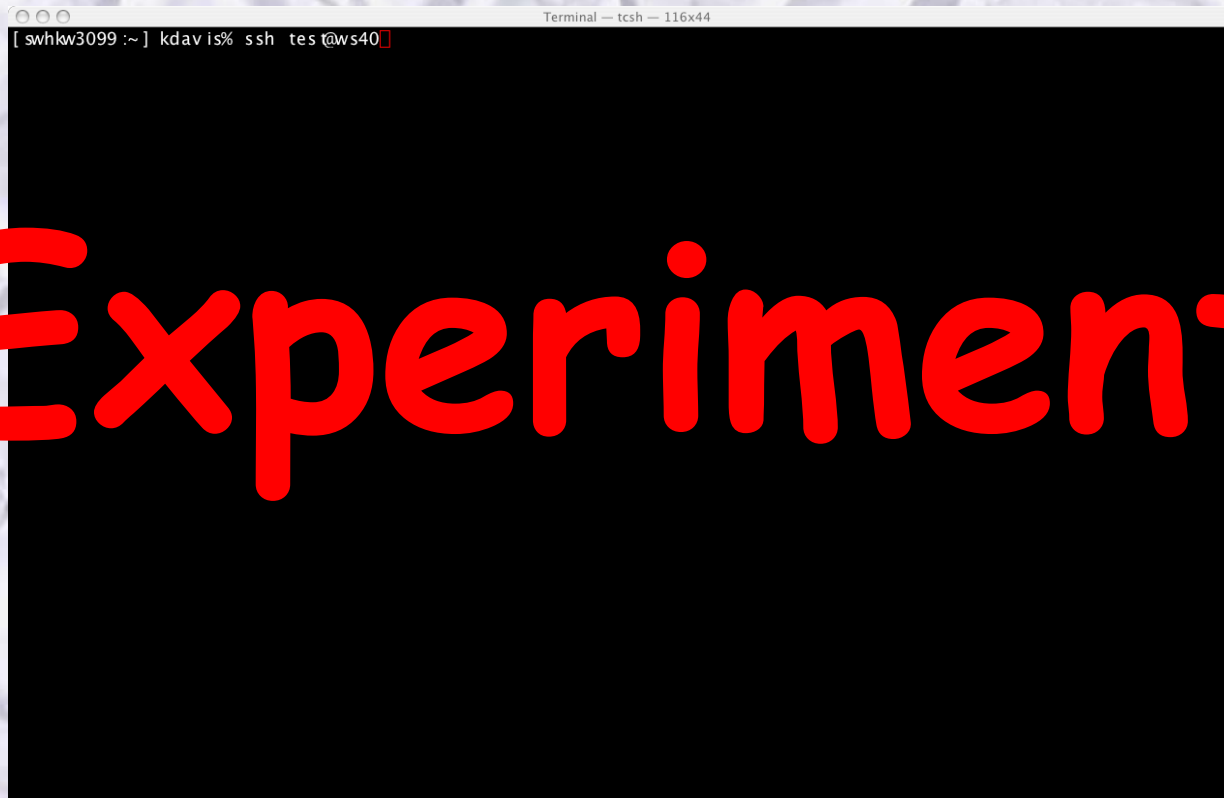
Installation



Information Society
Technologies

- Download, configure, make, make install...

```
ssh <user> @ws<0-40>
```

A terminal window titled "Terminal - tcsh - 116x44" showing a command prompt. The prompt is "[swkw3099 :~] kdav is% ssh tes@ws40". The terminal content is mostly black, indicating the command has been executed and the output is not visible.

```
Terminal - tcsh - 116x44
[swkw3099 :~] kdav is% ssh tes@ws40
```

Experiment



Installation



Information Society
Technologies

- Download, configure, make, make install...

```
ssh <user> @ws<0-40>
```

A terminal window titled "Terminal - tcsh - 116x44" showing a command prompt. The prompt is "[swhkw3099 :~] kdav is% ssh tes@ws40". The rest of the terminal is black, indicating the command has been executed and the output is not visible.

```
Terminal - tcsh - 116x44  
[swhkw3099 :~] kdav is% ssh tes@ws40
```

Author's name



Installation



Information Society
Technologies

- Download, configure, make, make install...

```
cd ~/tmp/GATEngine-distrib-0.99.2-2004-06-20
```

A terminal window titled "Terminal - tcsh - 122x47" showing the command `cd ~/tmp/GATEngine-distrib-0.99.2-2004-06-20` being executed. The terminal output is mostly black, indicating that the command was successful and the directory was changed. The prompt is `[swlkw3099 ~] kdavis% cd ~/tmp/GATEngine-distrib-0.99.2-2004-06-20`.

Author's name



Installation



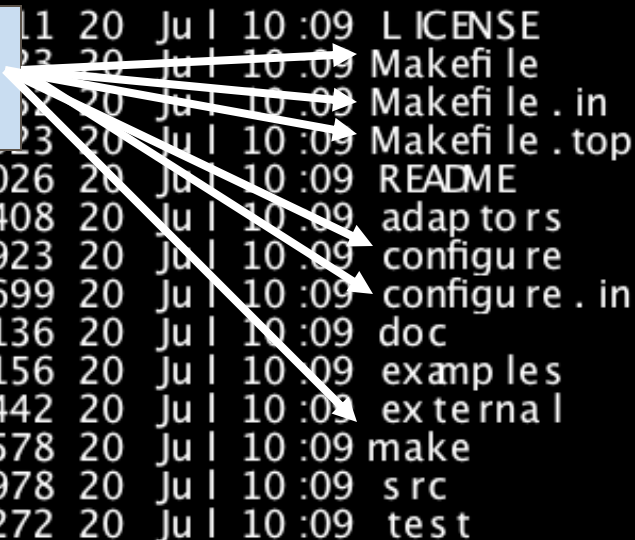
Information Society
Technologies

- Download, configure, make, make install...

ls -l

```
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% ls -l
total 216
-rw-r--r-- 1 kdavis staff 6026 20 Jul 10:09 LICENSE
-rw-r--r-- 1 kdavis staff 408 20 Jul 10:09 Makefile
-rw-r--r-- 1 kdavis staff 79923 20 Jul 10:09 Makefile.in
-rw-r--r-- 1 kdavis staff 1699 20 Jul 10:09 Makefile.top
-rw-r--r-- 1 kdavis staff 6026 20 Jul 10:09 README
drwxr-xr-x 12 kdavis staff 408 20 Jul 10:09 adapters
-rwxr-xr-x 1 kdavis staff 79923 20 Jul 10:09 configure
-rw-r--r-- 1 kdavis staff 1699 20 Jul 10:09 configure.in
drwxr-xr-x 4 kdavis staff 136 20 Jul 10:09 doc
drwxr-xr-x 34 kdavis staff 1156 20 Jul 10:09 examples
drwxr-xr-x 13 kdavis staff 442 20 Jul 10:09 external
drwxr-xr-x 17 kdavis staff 578 20 Jul 10:09 make
drwxr-xr-x 117 kdavis staff 3978 20 Jul 10:09 src
drwxr-xr-x 8 kdavis staff 272 20 Jul 10:09 test
```

configure and make stuff





Installation



Information Society
Technologies

- Download, configure, make, make install...

ls -l

```
[swhkw3099 :GAT/0.99.2/GATEng ine-d is tr ib-0.99.2-2004-06-20] kdavis% ls -l
total 216
-rw-r--r--  1 kdavis  staff   3311  20 Jul 10:09 LICENSE
-rw-r--r--  1 kdavis  staff    923  20 Jul 10:09 Makefile
-rw-r--r--  1 kdavis  staff   3552  20 Jul 10:09 Makefile.in
-rw-r--r--  1 kdavis  staff    923  20 Jul 10:09 Makefile.top
-rw-r--r--  1 kdavis  staff   6026  20 Jul 10:09 README
drwxr-xr-x 12 kdavis  staff    408  20 Jul 10:09 adap to rs
-rwxr-xr-x  1 kdavis  staff   79923  20 Jul 10:09 configure
-rw-r--r--  1 kdavis  staff    99  20 Jul 10:09 configure.in
drwxr-xr-x  1 kdavis  staff    56  20 Jul 10:09 doc
drwxr-xr-x  1 kdavis  staff    56  20 Jul 10:09 exam p les
drwxr-xr-x 15 kdavis  staff    442  20 Jul 10:09 exte rna l
drwxr-xr-x 17 kdavis  staff    578  20 Jul 10:09 make
drwxr-xr-x 117 kdavis  staff   3978  20 Jul 10:09 src
drwxr-xr-x  8 kdavis  staff    272  20 Jul 10:09 test
```

LICENSE and README



Installation



Information Society
Technologies

- Download, configure, make, make install...

ls -l

```
[swhkw3099 :GAT/0.99.2/GATEng ine-distrib-0.99.2-2004-06-20] kdavis% ls -l
total 216
-rw-r--r--  1 kdavis  staff   3311  20 Jul 10:09 LICENSE
-rw-r--r--  1 kdavis  staff    923  20 Jul 10:09 Makefile
-rw-r--r--  1 kdavis  staff   3552  20 Jul 10:09 Makefile.in
-rw-r--r--  1 kdavis  staff    923  20 Jul 10:09 Makefile.top
-rw-r--r--  1 kdavis  staff    226  20 Jul 10:09 README
drwxr-xr-x  1 kdavis  staff    98  20 Jul 10:09 adaptors
-rw-r--r--  1 kdavis  staff    23  20 Jul 10:09 configure
-rw-r--r--  1 kdavis  staff   1699  20 Jul 10:09 configure.in
drwxr-xr-x  4 kdavis  staff    136  20 Jul 10:09 doc
drwxr-xr-x 34 kdavis  staff   1156  20 Jul 10:09 examples
drwxr-xr-x 13 kdavis  staff    442  20 Jul 10:09 external
drwxr-xr-x 17 kdavis  staff    578  20 Jul 10:09 make
drwxr-xr-x 117 kdavis  staff   3978  20 Jul 10:09 src
drwxr-xr-x  8 kdavis  staff    272  20 Jul 10:09 test
```

Default adaptors



Installation



Information Society
Technologies

- Download, configure, make, make install...

ls -l

```
[swhkw3099 :GAT/0.99.2/GATEng ine-distrib-0.99.2-2004-06-20] kdavis% ls -l
total 216
-rw-r--r-- 1 kdavis staff 2311 20 Jul 10:09 LICENSE
-rwxr-xr-x 1 kdavis staff 23 20 Jul 10:09 Makefile
-rwxr-xr-x 1 kdavis staff 22 20 Jul 10:09 Makefile.in
-rwxr-xr-x 1 kdavis staff 23 20 Jul 10:09 Makefile.top
-rw-r--r-- 1 kdavis staff 6026 20 Jul 10:09 README
drwxr-xr-x 12 kdavis staff 408 20 Jul 10:09 adaptors
-rwxr-xr-x 1 kdavis staff 79923 20 Jul 10:09 configure
-rw-r--r-- 1 kdavis staff 1699 20 Jul 10:09 configure.in
drwxr-xr-x 4 kdavis staff 136 20 Jul 10:09 doc
drwxr-xr-x 34 kdavis staff 1156 20 Jul 10:09 examples
drwxr-xr-x 13 kdavis staff 442 20 Jul 10:09 external
drwxr-xr-x 17 kdavis staff 578 20 Jul 10:09 make
drwxr-xr-x 117 kdavis staff 3978 20 Jul 10:09 src
drwxr-xr-x 8 kdavis staff 272 20 Jul 10:09 test
```

example code



Installation



Information Society
Technologies

- Download, configure, make, make install...

ls -l

```
[swhkw3099 :GAT/0.99.2/GATEng ine-distrib-0.99.2-2004-06-20] kdavis% ls -l
total 216
-rw-r--r--  1 kdavis  staff   3311  20 Jul 10:09 LICENSE
-rw-r--r--  1 kdavis  staff    923  20 Jul 10:09 Makefile
-rw-r--r--  1 kdavis  staff   3552  20 Jul 10:09 Makefile.in
-rw-r--r--  1 kdavis  staff    923  20 Jul 10:09 Makefile.top
-rw-r--r--  1 kdavis  staff   6026  20 Jul 10:09 README
drwxr-xr-x 13 kdavis  staff    408  20 Jul 10:09 adapters
-rw-r--r--  1 kdavis  staff    23  20 Jul 10:09 configure
-rw-r--r--  1 kdavis  staff    99  20 Jul 10:09 configure.in
drwxr-xr-x  6 kdavis  staff    36  20 Jul 10:09 doc
drwxr-xr-x 34 kdavis  staff   1156  20 Jul 10:09 examples
drwxr-xr-x 13 kdavis  staff    442  20 Jul 10:09 external
drwxr-xr-x 17 kdavis  staff    578  20 Jul 10:09 make
drwxr-xr-x 117 kdavis  staff   3978  20 Jul 10:09 src
drwxr-xr-x  8 kdavis  staff    272  20 Jul 10:09 test
```

External libraries



Installation



Information Society
Technologies

- Download, configure, make, make install...

ls -l

```
[swhkw3099 :GAT/0.99.2/GATEng ine-distrib-0.99.2-2004-06-20] kdavis% ls -l
total 216
-rw-r--r--  1 kdavis  staff   3311  20 Jul 10:09 LICENSE
-rw-r--r--  1 kdavis  staff    923  20 Jul 10:09 Makefile
-rw-r--r--  1 kdavis  staff   3552  20 Jul 10:09 Makefile.in
-rw-r--r--  1 kdavis  staff    923  20 Jul 10:09 Makefile.top
-rw-r--r--  1 kdavis  staff   6026  20 Jul 10:09 README
drwxr-xr-x 13 kdavis  staff    408  20 Jul 10:09 adap tors
-rw-r--r--  1 kdavis  staff    23  20 Jul 10:09 configure
-rw-r--r--  1 kdavis  staff    99  20 Jul 10:09 configure.in
drwxr-xr-x  6 kdavis  staff    36  20 Jul 10:09 doc
drwxr-xr-x 34 kdavis  staff   1156  20 Jul 10:09 exam ples
drwxr-xr-x 13 kdavis  staff    442  20 Jul 10:09 externa l
drwxr-xr-x 17 kdavis  staff    578  20 Jul 10:09 make
drwxr-xr-x 117 kdavis  staff   3978  20 Jul 10:09 src
drwxr-xr-x  8 kdavis  staff    272  20 Jul 10:09 test
```

The source Luke



Installation



Information Society
Technologies

- Download, configure, make, make install...

ls -l

```
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% ls -l
total 216
-rw-r--r--  1 kdavis  staff   3311  20 Jul 10:09 LICENSE
-rw-r--r--  1 kdavis  staff    923  20 Jul 10:09 Makefile
-rw-r--r--  1 kdavis  staff   3552  20 Jul 10:09 Makefile.in
-rw-r--r--  1 kdavis  staff    23  20 Jul 10:09 Makefile.top
-rw-r--r--  1 kdavis  staff    26  20 Jul 10:09 README
drwxr-xr-x  1 kdavis  staff    98  20 Jul 10:09 adapters
-rw-r--r--  1 kdavis  staff   7523  20 Jul 10:09 configure
-rw-r--r--  1 kdavis  staff   1699  20 Jul 10:09 configure.in
drwxr-xr-x  4 kdavis  staff    136  20 Jul 10:09 doc
drwxr-xr-x 34 kdavis  staff   1156  20 Jul 10:09 examples
drwxr-xr-x 13 kdavis  staff    442  20 Jul 10:09 external
drwxr-xr-x 17 kdavis  staff    578  20 Jul 10:09 make
drwxr-xr-x 117 kdavis  staff   3978  20 Jul 10:09 src
drwxr-xr-x  8 kdavis  staff    272  20 Jul 10:09 test
```



Installation



● Set Environment

- `setenv GAT_LOCATION `pwd`/loc_install/`

A screenshot of a terminal window titled "Terminal - tcsh - 116x44". The terminal shows the command `[swhkw3099 :GAT/0 .99 .2/GATEng ine-d is tr ib-0 .99 .2-2004-06-20] kdav is% setenv GAT_LOCATION `pwd` / loc_ ins ta ll/` being entered. The rest of the terminal is black, indicating the command was executed successfully.

```
Terminal - tcsh - 116x44
[ swhkw3099 :GAT/0 .99 .2/GATEng ine-d is tr ib-0 .99 .2-2004-06-20 ] kdav is% setenv GAT_LOCATION `pwd` / loc_ ins ta ll/
```

Author's name



Installation



● Set Environment

● echo \$GAT_LOCATION

```
Terminal — tcsh — 122x47
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% setenv GAT_LOCATION `pwd` /loc_install/
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% echo $GAT_LOCATION
/Users/kdavis/Applications/GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20/loc_install/
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis%
```




Installation



● Set Environment

- `setenv GAT_ADAPTOR_PATH $GAT_LOCATION/lib/GAT/adaptor-list`

```
Terminal — tcsh — 122x47
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% setenv GAT_LOCATION `pwd` / loc_install/
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% echo $GAT_LOCATION
/Users/kdavis/Applications/GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20/loc_install/
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% setenv GAT_ADAPTOR_PATH $GAT_LOCATION/lib/GAT/adaptor-list
```

Author's name



Installation



● Set Environment

- echo \$GAT_ADAPTOR_PATH

```
Terminal - tcsh - 122x47
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% setenv GAT_LOCATION `pwd` / loc_install/
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% echo $GAT_LOCATION
/Users/kdavis/Applications/GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20/loc_install/
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% setenv GAT_ADAPTOR_PATH $GAT_LOCATION/lib/GAT/adaptor-list
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% echo $GAT_ADAPTOR_PATH
/Users/kdavis/Applications/GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20/loc_install/lib/GAT/adaptor-list
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% █
```



Installation



Test



cd examples

```
Terminal - tcsh - 122x47
[swkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% setenv GAT_LOCATION `pwd` / loc_install/
[swkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% echo $GAT_LOCATION
/Users/kdavis/Applications/GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20/loc_install/
[swkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% setenv GAT_ADAPTOR_PATH $GAT_LOCATION/lib/GAT/adaptor-list
[swkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% echo $GAT_ADAPTOR_PATH
/Users/kdavis/Applications/GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20/loc_install/lib/GAT/adaptor-list
[swkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% cd examples/
```





Installation



● Test

- `./example_01_-_initialization`

```
Terminal - tcsh - 122x47
[swHKW3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% setenv GAT_LOCATION `pwd` / loc_install/
[swHKW3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% echo $GAT_LOCATION
/Users/kdavis/Applications/GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20/loc_install/
[swHKW3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% setenv GAT_ADAPTOR_PATH $GAT_LOCATION/lib/GAT/adaptor-list
[swHKW3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% echo $GAT_ADAPTOR_PATH
/Users/kdavis/Applications/GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20/loc_install/lib/GAT/adaptor-list
[swHKW3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% cd examples/
[swHKW3099 :0.99.2/GATEngine-distrib-0.99.2-2004-06-20/examples] kdavis% ./example_01_-_initialization
```





Hello Cruel World

Kelly Davis

`kdavis@aei.mpg.de`

MPI-AEI



Author's name

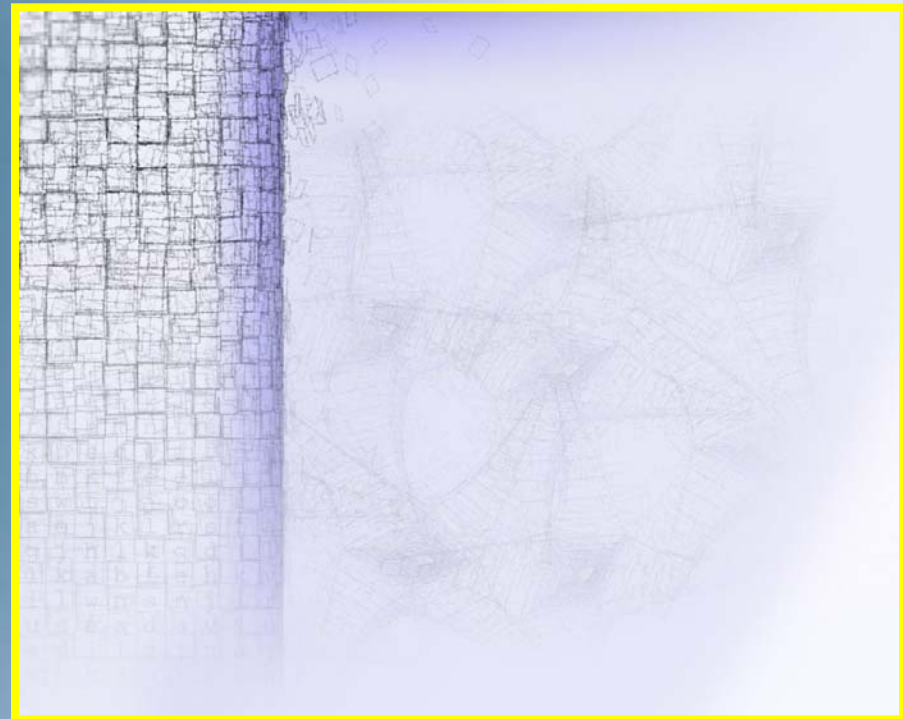


Hello Cruel World: Outline



 Code

 Run





Hello Cruel World



Information Society
Technologies

Code

```
cd $GAT_LOCATION/./examples
```

A screenshot of a terminal window. The title bar reads "Terminal - tcsh - 122x47". The prompt is "[swlkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis%". The command "cd \$GAT_LOCATION/./examples/" has been entered and executed, resulting in a blank terminal window.

```
Terminal - tcsh - 122x47
[ swlkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20 ] kdavis% cd $GAT_LOCATION/./examples/
```

Author's name



Hello Cruel World



Information Society
Technologies

Code

```
vi example_03_-_file_size.c
```

```
Terminal - tcsh - 122x47
[swhkw3099 .CAT/0.99.2/GATEng ine-distrib-0.99.2-2004-06-20] kdavis% cd $CAT_LOCAT DN/./examples/
[swhkw3099 :0.99.2/GATEng ine-distrib-0.99.2-2004-06-20/examples] kdavis% vi example_03_-_file_size.c
```

Author's name



Hello Cruel World



Information Society
Technologies

Code

```
vi example_03_-_file_size.c
```

```
Terminal — vim — 122x47
*****
*
* @file: examples/example_03_-_file_size.c
*
* @description:
*   example number 3: simple example for GAT file object
*
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 *
 * "example_03_-_file_size.c" 136L, 5355C
```

Author's name



Hello Cruel World



Information Society
Technologies

Code

```
vi example_03_-_file_size.c
```

```
Terminal - vim - 122x47
*****
*
* @file: examples/example_03_-_file_size.c
*
* @description:
*   example number 3: simple example for GAT file object
*
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 * and the following disclaimer.
 *
 * "example_03_-_file_size.c" 136L, 5355C
```

Examine the code

Author's name



Hello Cruel World



● Run

```
./example_03_-_file_size example_03_-_file_size.c
```

```
Terminal - tcsh - 122x47
[swlkw3099 :CAT/0.99.2/CATEng ine-d istrib-0.99.2-2004-06-20] kdavis% cd $CAT_LOCATION/./examples/
[swlkw3099 :0.99.2/CATEng ine-d istrib-0.99.2-2004-06-20/examp les] kdavis% vi example_03_-_fi le_s_ize.c
[swlkw3099 :0.99.2/CATEng ine-d istrib-0.99.2-2004-06-20/examp les] kdavis% ./examp le_03_-_fi le_s_ize example_03_-_fi le_s_ize.c
```



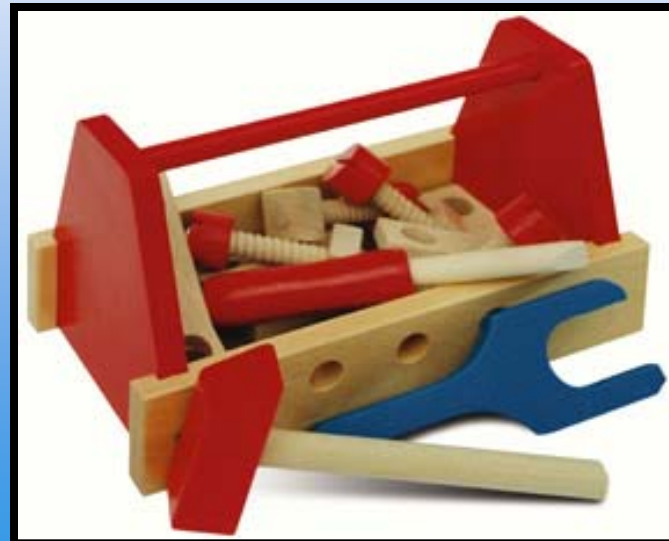


File Management

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`kdavis@aei.mpg.de`

MPI-AEI



Author's name

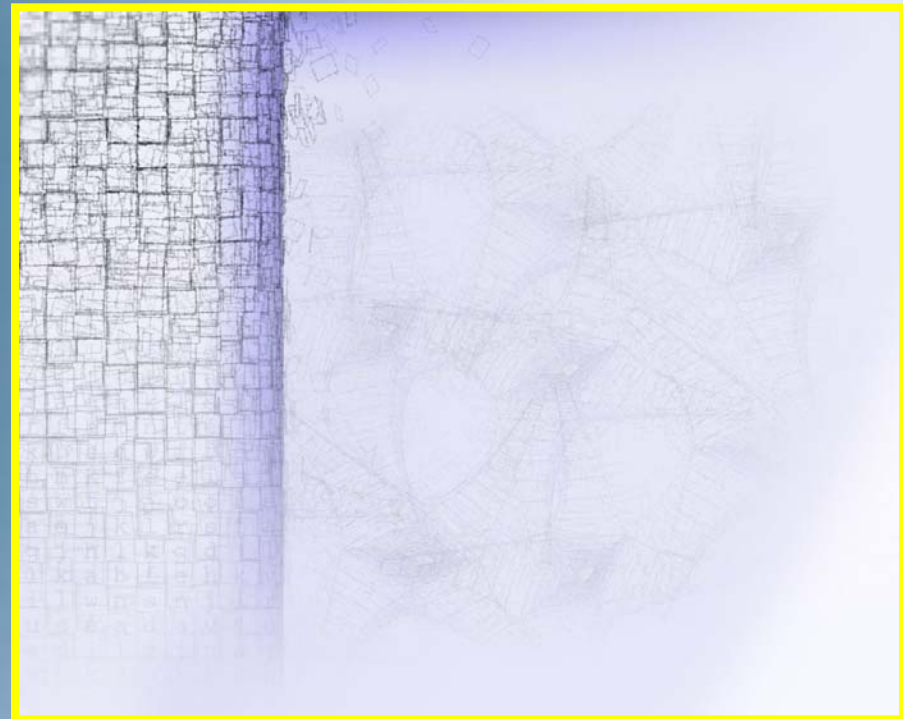


File Management: Outline



- File Package
 - Overview
 - The GATFile class

- Code
 - Example
 - Exercise





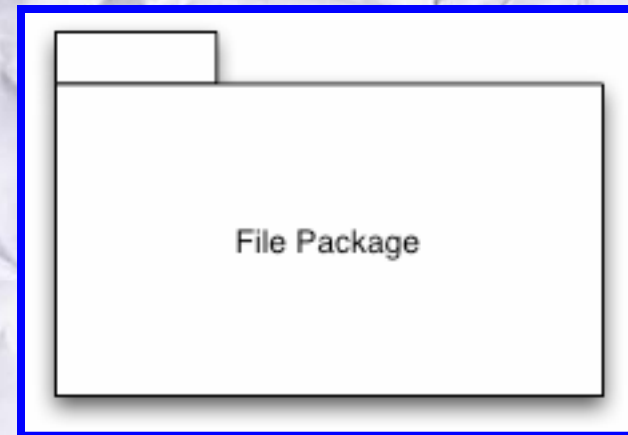
File Management



Information Society
Technologies

- File Package
 - Overview

The File Package allows application programmers to manipulate Files in a “Grid” environment.





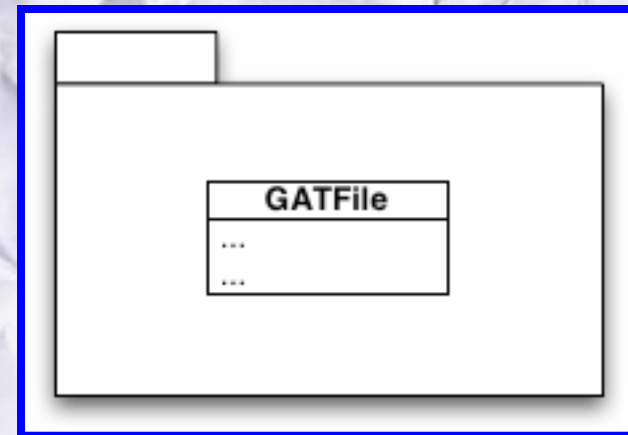
File Management



Information Society
Technologies

- File Package
 - Overview

...and contains a single class!





File Management

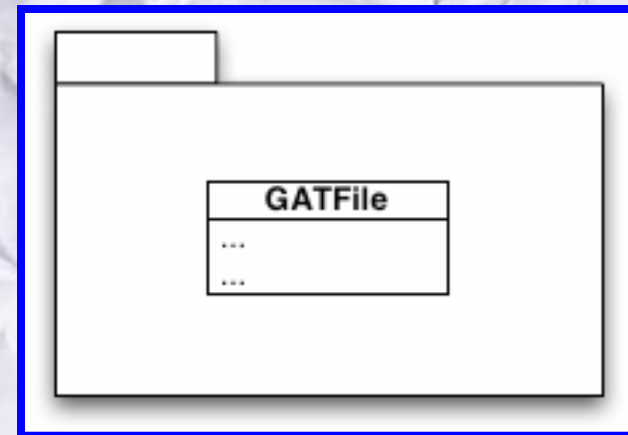


Information Society
Technologies

- File Package
 - Overview

GATFile allows an application to

- Copy Files
- Move Files
- Delete Files
- Examine Files
- ...



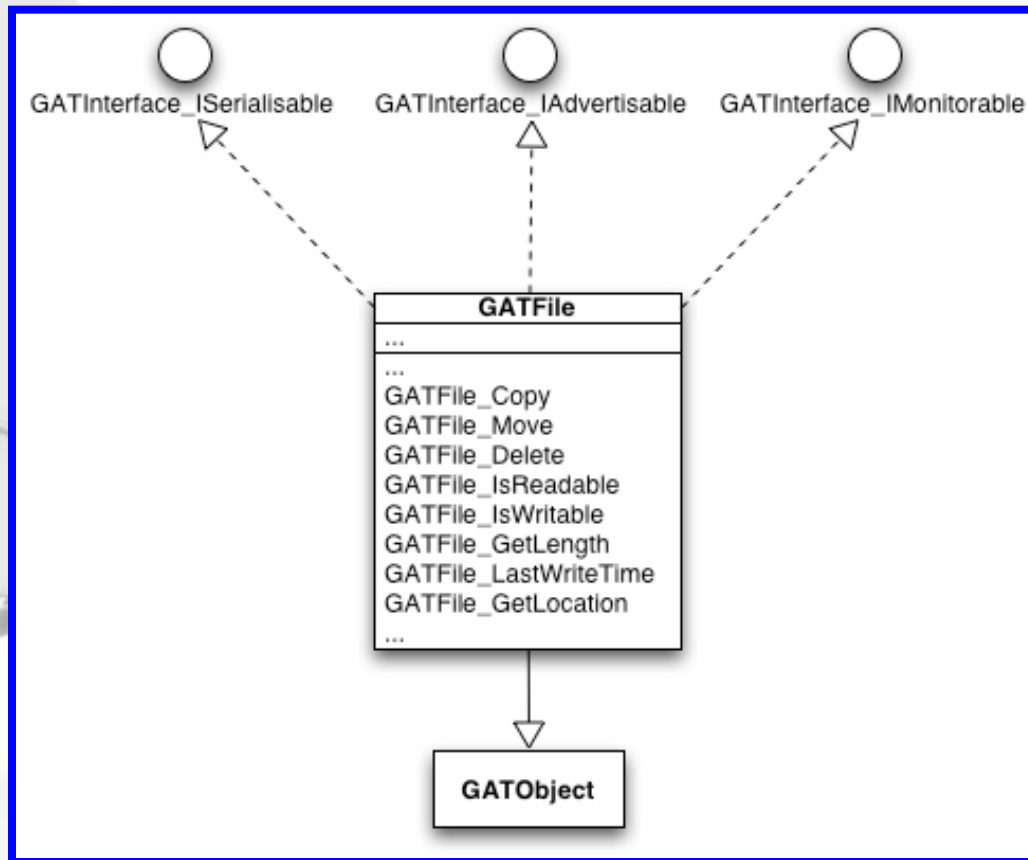


File Management



File Package

- The GATFile class copies, moves, deletes...files





File Management



Code

Example

```
cd $GAT_LOCATION/./examples
```

A terminal window titled "Terminal - tcsh - 122x47" showing the command `cd $GAT_LOCATION/./examples` being executed. The terminal output is blank, indicating the command was successful. The prompt is `[shlw3099 .GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% cd $GAT_LOCATION/./examples/`.



File Management



Code

Example

```
vi example_03_-_file_size.c
```

```
Terminal - tcsh - 122x47
[swlkw3099 :GAT/0.99.2/GATEngineering-distrib-0.99.2-2004-06-20] kdavis% cd $GAT_LOCATION/./examples/
[swlkw3099 :0.99.2/GATEngineering-distrib-0.99.2-2004-06-20/examples] kdavis% vi example_03_-_file_size.c
```





File Management



● Code

● Example

vi example_03_-_file_size.c

```
Terminal -- vim -- 122x47
/*****
 *
 * @file: examples/example_03_-_file_size.c
 *
 * @description:
 *   example number 3: simple example for GATfile object
 *
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 *
 * "example_03_-_file_size.c" 136L, 5355C

```



Author's name



File Management



Code

Example

vi example_03_-_file_size.c

```
Terminal -- vim -- 122x47
/*****
 *
 * @file: examples/example_03_-_file_size.c
 *
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 *
 * "example_03_-_file_size.c" 136L, 5355C
```

Examine the code





File Management



Code

Example

```
./example_03_-_file_size example_03_-_file_size.c
```

```
Terminal — tcsh — 122x47
[swlkw3099 :GAT/0.99.2/GATEngineering-distrib-0.99.2-2004-06-20] kdavis% cd $GAT_LOCATION/./examples/
[swlkw3099 :0.99.2/GATEngineering-distrib-0.99.2-2004-06-20/examples] kdavis% vi example_03_-_file_size.c
[swlkw3099 :0.99.2/GATEngineering-distrib-0.99.2-2004-06-20/examples] kdavis% ./example_03_-_file_size example_03_-_file_size.c
```





File Management



● Code

● Exercise

Modify `example_03_-_file_size.c` to delete a file instead of getting its length.

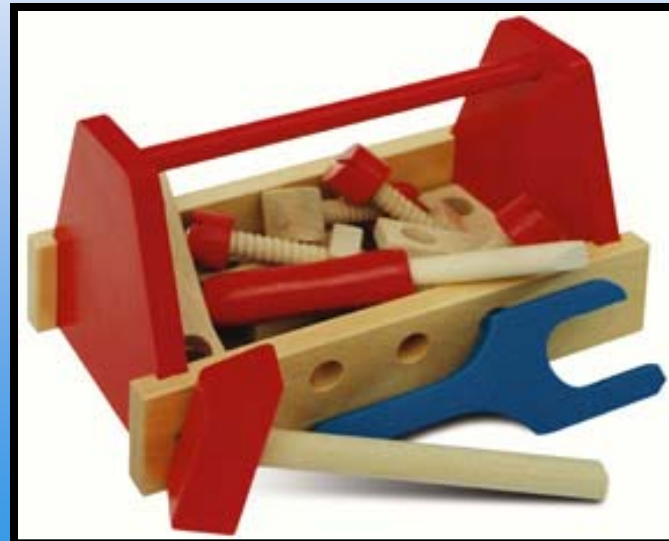


FileStream Management

Kelly Davis

kdavis@aei.mpg.de

MPG-AEI



Author's name

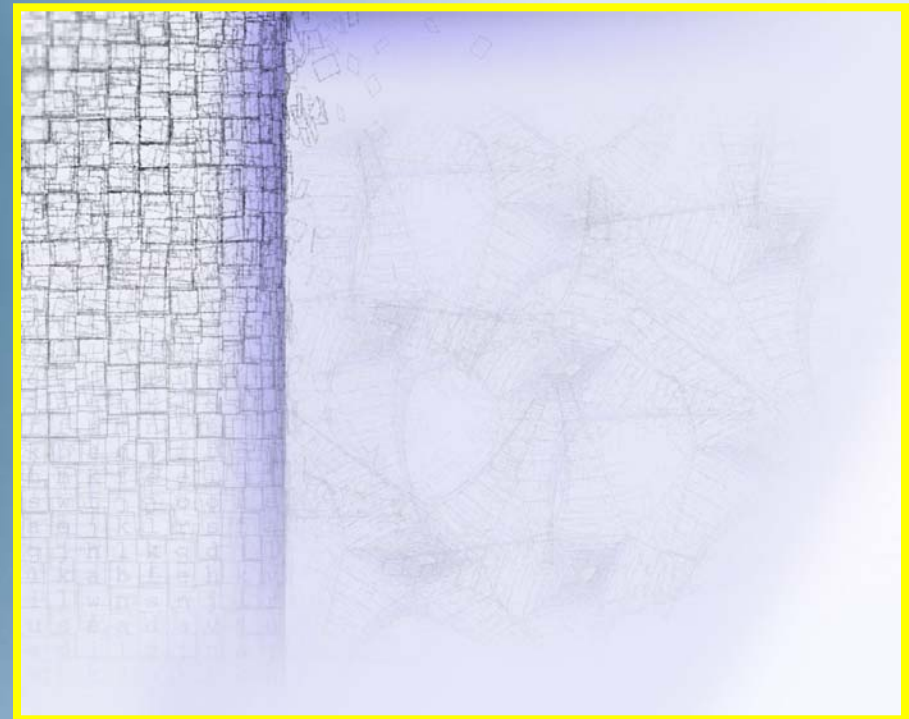


FileStream Management: Outline



- Stream Package
 - Overview
 - GATFileStream class

- Code
 - Example
 - Exercise





FileStream Management



Information Society
Technologies

- Stream Package
 - Overview

The Stream Package allows application programmers to stream data to and from remote or local processes and to stream data to and from remote or local files.

A diagram of a folder icon with a tab on the top left. The folder is outlined in blue and contains the text "Stream Package".

Stream Package



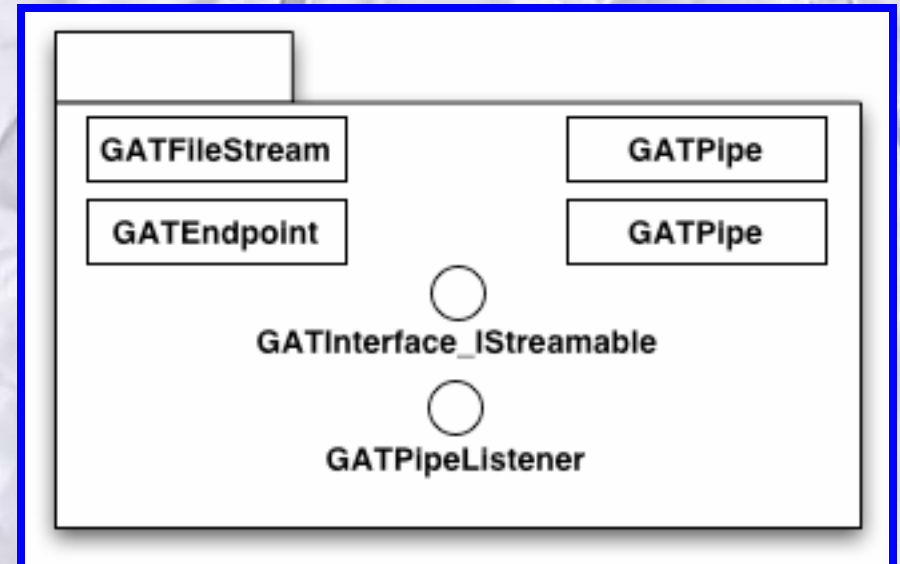
FileStream Management



Information Society
Technologies

- Stream Package
 - Overview

... and consists of various classes and interfaces.





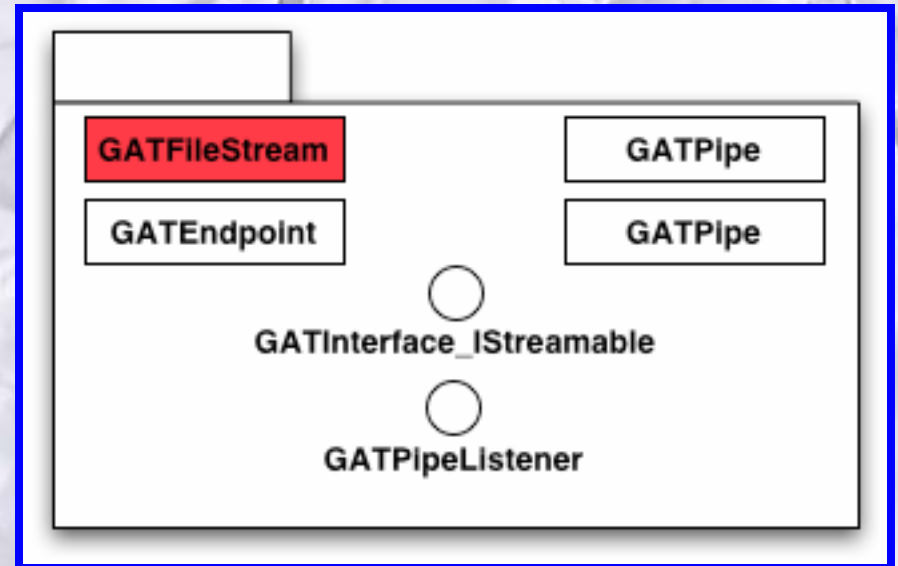
FileStream Management



Information Society
Technologies

- Stream Package
 - Overview

We'll cover only *GATFileStream*.

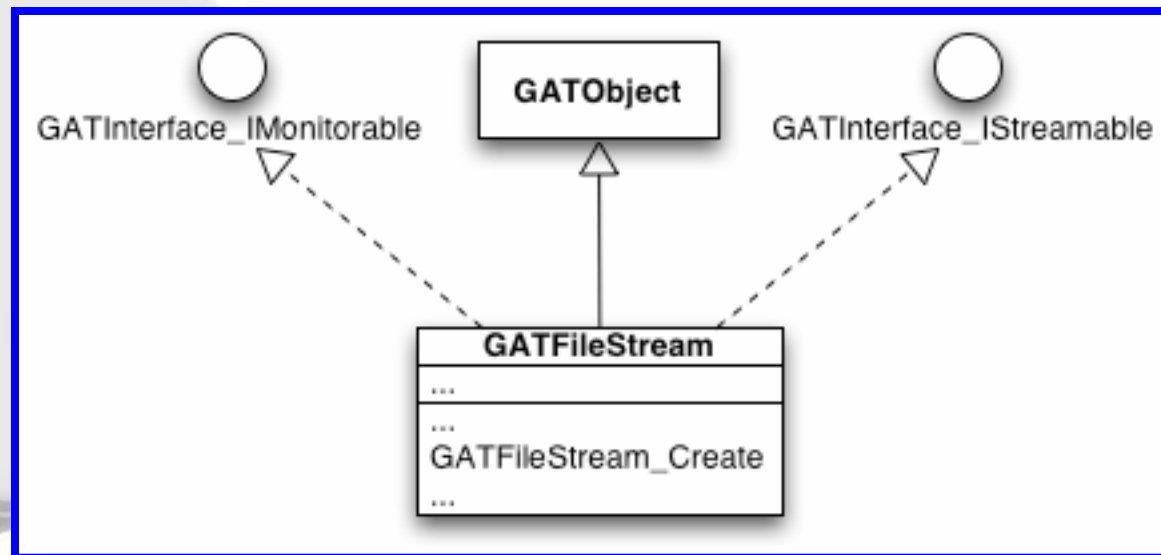




FileStream Management



- Stream Package
 - GATFileStream class streams data to/from a file





FileStream Management



● Code

● Example

```
cd $GAT_LOCATION/./examples
```

A terminal window titled "Terminal - tcsh - 122x47" showing the command `cd $GAT_LOCATION/./examples` being executed. The terminal output is mostly black, indicating the command was successful and the directory was changed. The prompt is `[shlw3099 .GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis%``.



FileStream Management



● Code

● Example

```
vi example_20_-_filestream_simple.c
```

```
Terminal - tcsh - 122x47
[swlkw3099:0.99.2/GATEng ine-d istr ib-0.99.2-2004-06-20/examp les] kdav is% cd $CAT_LOCATION/../../examp les
[swlkw3099:0.99.2/GATEng ine-d istr ib-0.99.2-2004-06-20/examp les] kdav is% vi example_20_-_filestream_s mp le.c
```





FileStream Management



Code

Example

```
vi example_20_-_filestream_simple.c
```

```
Terminal - vim - 122x47
*****
*
* @file: examples/example_20_-_filestream_simple.c
*
* @description:
*   example number 20: simple example for GAT FileStream
*   object
*
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*
"example_20_-_filestream_simple.c" 133L, 5345C
```





FileStream Management



Code

Example

```
vi example_20_-_filestream_simple.c
```

```
Terminal - vim - 122x47
*****
*
* @file: examples/example_20_-_filestream_simple.c
*
* @description:
*   example number 20: simple example for GATFileStream
*   object
*
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 *
 * "example_20_-_filestream_simple.c" 133L, 5345C
```

Examine the code



Author's name



FileStream Management



Code

Example

```
./example_20_-_filestream_simple Hello World.txt
```

```
Terminal — tcsh — 122x47
[swlkw3099:0.99.2/GATEngineering-distrib-0.99.2-2004-06-20/examples] kdavis% cd $GAT_LOCATION/./examples
[swlkw3099:0.99.2/GATEngineering-distrib-0.99.2-2004-06-20/examples] kdavis% vi example_20_-_filestream_simple.c
[swlkw3099:0.99.2/GATEngineering-distrib-0.99.2-2004-06-20/examples] kdavis% ./example_20_-_filestream_simple Hello World.txt
```





FileStream Management



● Code

● Exercise

Modify `example_20_-_filestream_simple.c` to write your name, say, to file.

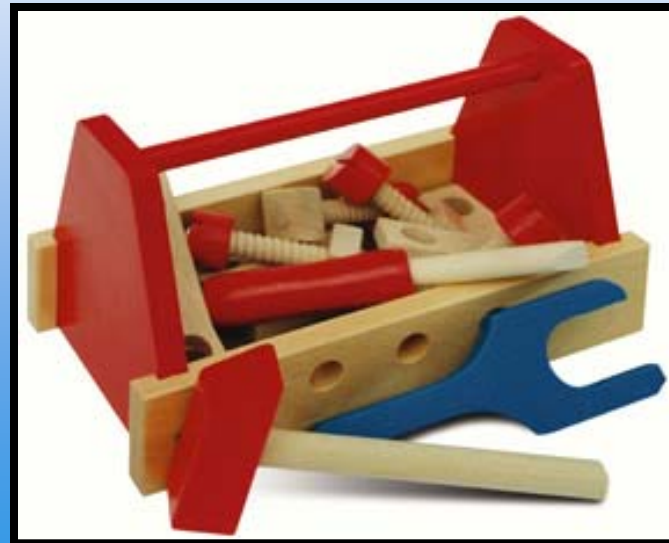


LogicalFile Management

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MPI-AEI



Author's name



LogicalFile Management: Outline

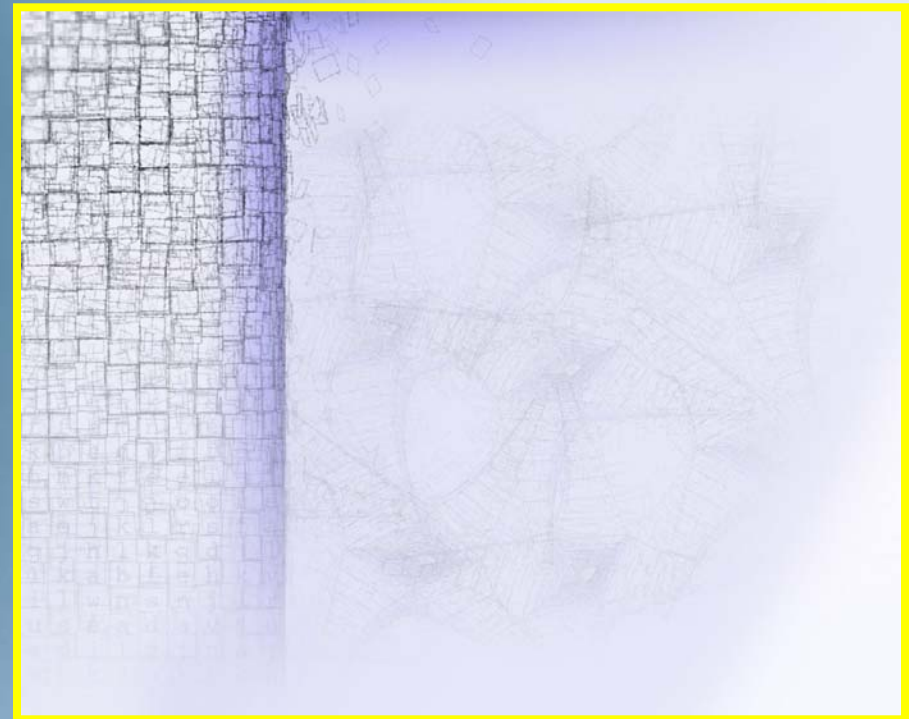


■ LogicalFile Package

- Overview
- GATLogicalFile class

■ Code

- Example





LogicalFile Management



Information Society
Technologies

- LogicalFile Package
 - Overview

The LogicalFile Package exists to replicate files which are identical, but dispersed geographically in an efficient manner.

A diagram of a folder icon with a tab on the top left. The folder is outlined in blue and contains the text "LogicalFile Package" in the center.

LogicalFile Package



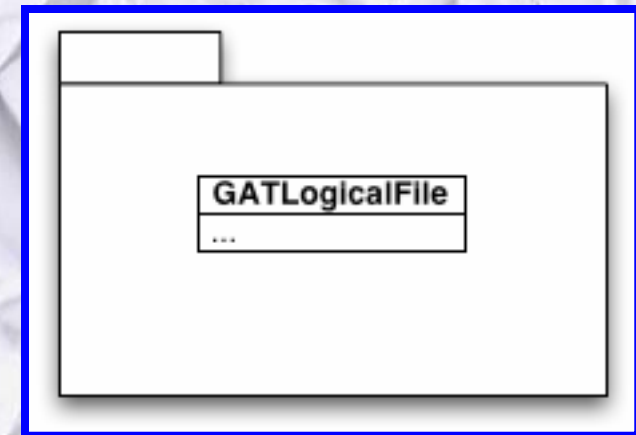
LogicalFile Management



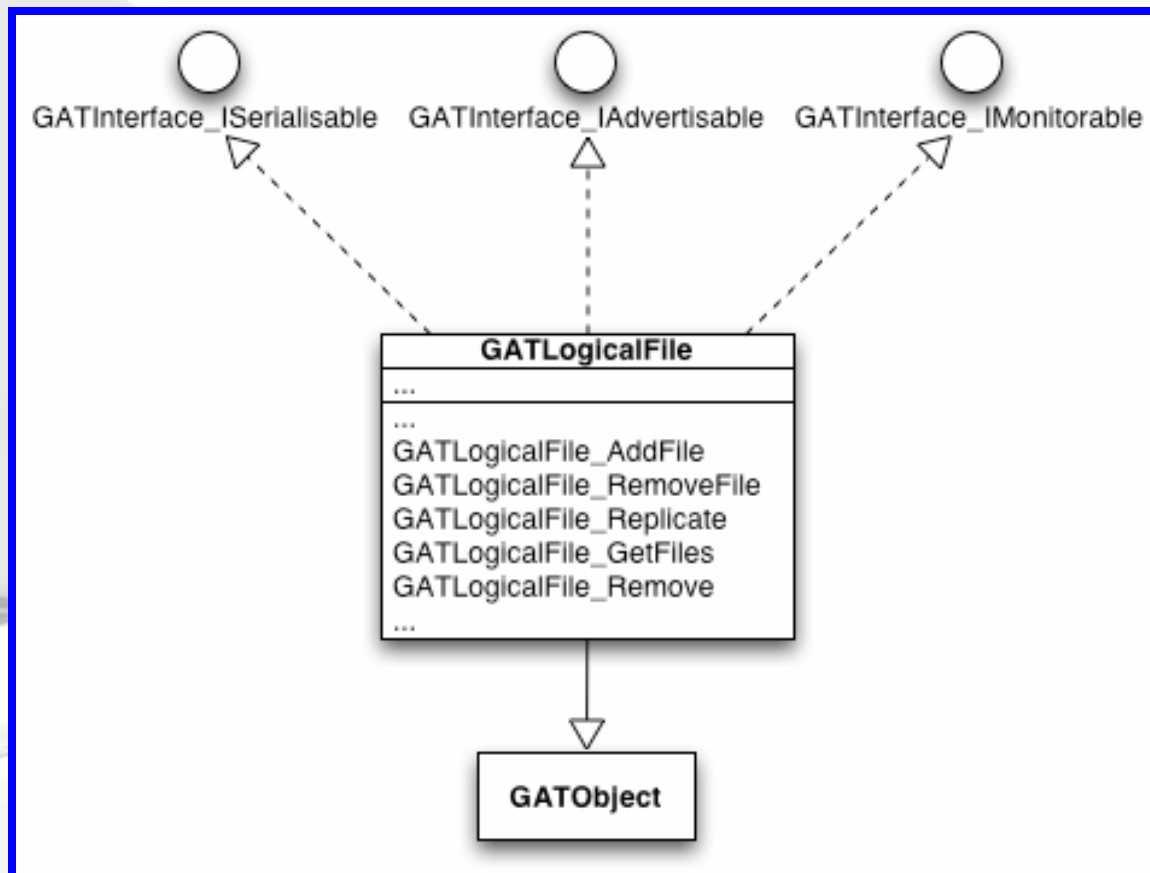
Information Society
Technologies

- LogicalFile Package
 - Overview

...and consists of a single class!



- LogicalFile Package
 - GATLogicalFile class replicates files in a “Grid” environment





LogicalFile Management



● Code

● Example

```
cd $GAT_LOCATION/./examples
```

A terminal window titled "Terminal - tcsh - 122x47" showing the command `cd $GAT_LOCATION/./examples` being executed. The terminal output is a black screen, indicating the command was successful. The terminal prompt is `[shlw3099 .GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% cd $GAT_LOCATION/./examples/`.



LogicalFile Management



Code

Example

```
vi example_31_-_logicalfile_ops.c
```

```
Terminal - tcsh - 122x47
[swlkw3099 :CAT/0.99.2/GATEng ine-distrib-0.99.2-2004-06-20] kdavis% cd $CAT_LOCAT DN/./examples/
[swlkw3099 :0.99.2/GATEng ine-distrib-0.99.2-2004-06-20/examples] kdavis% vi example_31_-_logicalfile_ops.c
```





LogicalFile Management



Code

Example

vi example_31_-_logicalfile_ops.c

```
Terminal - vim - 122x47
*****
*
* @file: examples/example_31_-_logicalfile_ops.c
*
* @description:
*   example #40: how to use GAT Logical File interfacing
*   to replica cata logs, and its main methods
*
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 * "example_31_-_logicalfile_ops.c" 166L, 6723C
```





LogicalFile Management



Code

Example

vi example_31_-_logicalfile_ops.c

```
Terminal - vim - 122x47
*****
*
* @file: examples/example_31_-_logicalfile_ops.c
*
* @description:
*   example #40: how to use GAT Logical File interfacing
*   to replica cata logs, and its main methods
*
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 * "example_31_-_logicalfile_ops.c" 166L, 6723C
```

Examine the code





LogicalFile Management



Code

Example

```
./example_31_-_logicalfile_ops myfirstlogicalfile \  
example_31_-_logicalfile_ops.c example_31_-_logicalfile_ops.c.bak
```

```
Terminal -- tcsh -- 122x47  
[swhkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% cd $GAT_LOCATION/./examples/  
[swhkw3099 :0.99.2/GATEngine-distrib-0.99.2-2004-06-20/examples] kdavis% vi example_31_-_logicalfile_ops.c  
[swhkw3099 :0.99.2/GATEngine-distrib-0.99.2-2004-06-20/examples] kdavis% ./example_31_-_logicalfile_ops myfirstlogicalfile  
example_31_-_logicalfile_ops.c example_31_-_logicalfile_ops.c.bak
```





Advert Management

Kelly Davis

`kdavis@aei.mpg.de`

MPI-AEI



Author's name



Advert Management

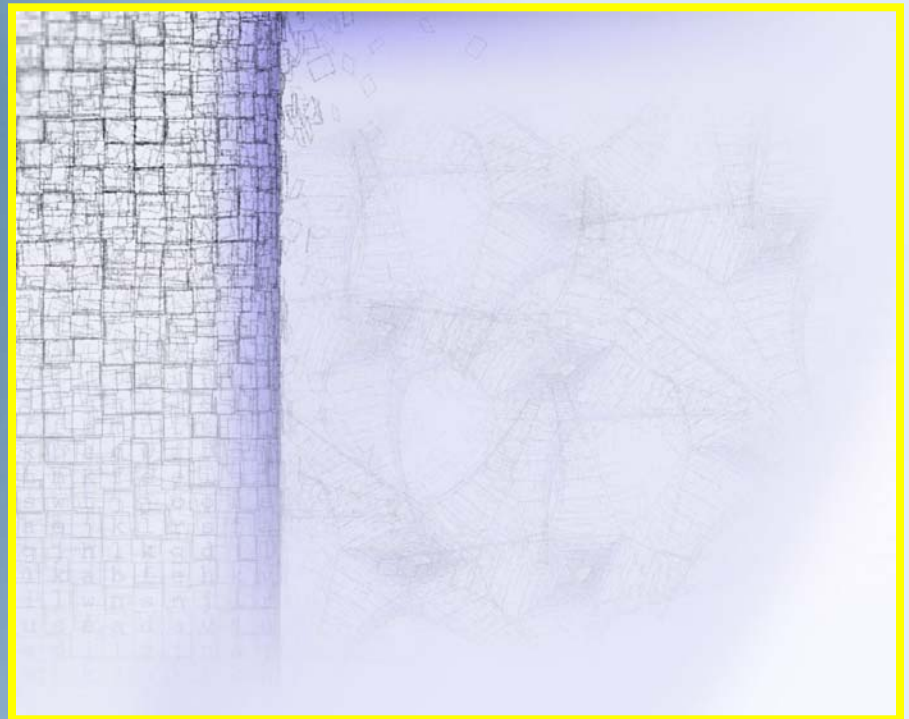


Advert Package

- Overview
- GATInterface_Iadvertisable
- GATAdvertService class

Code

- Example





Advert Management



Information Society
Technologies

- Advert Package
 - Overview

The Advert Package allows an application to persistently store objects “advertisables”, query such stored advertisables, and move such advertisables across machine and language boundaries.





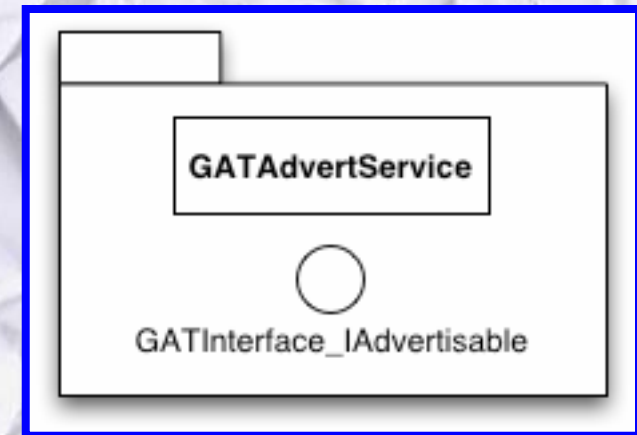
Advert Management



Information Society
Technologies

- Advert Package
 - Overview

... and consists of only one class and one interface.





Advert Management



- Advert Package
 - GATInterface_IAdvertisable

The interface `GATInterface_IAdvertisable` marks objects capable of being persisted in a `GATAdvertService`, it's similar to Java's `Serializable`.



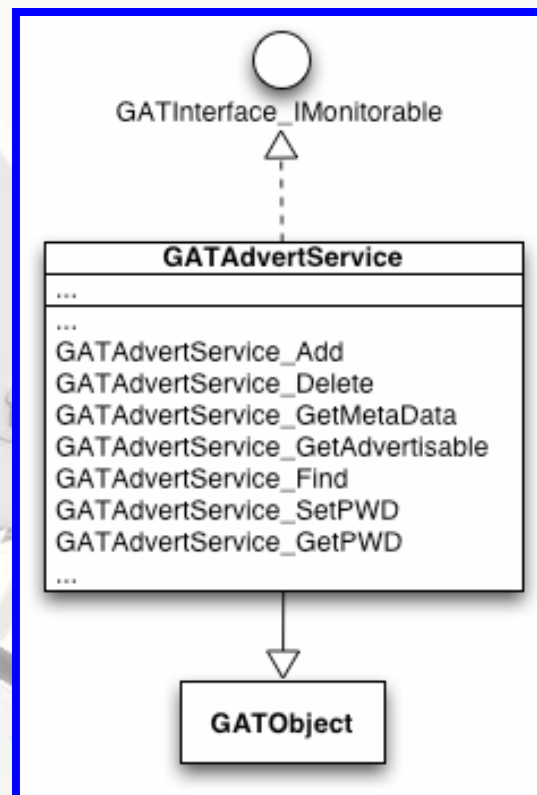


Advert Management



● Advert Package

- GATAdvertService - Stores advertisables and allows one to query for these advertisables across machine boundaries.





Advert Management



Code

Example

```
cd $GAT_LOCATION/./examples
```

A terminal window titled "Terminal - tcsh - 122x47" showing the command `cd $GAT_LOCATION/./examples` being executed. The terminal output is mostly black, indicating the command was successful and the directory was changed. The prompt is `[swhkw3099 .GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% cd $GAT_LOCATION/./examples/`.



Advert Management



Code

Example

```
vi example_41_-_advertservice_ops.c
```

```
Terminal - tcsh - 122x47
[swlkw3099 :CAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% cd $CAT_LOCATION/./examples/
[swlkw3099 :0.99.2/GATEngine-distrib-0.99.2-2004-06-20/examples] kdavis% vi example_41_-_advertservice_ops.c
```





Advert Management



Code

Example

vi example_41_-_advertservice_ops.c

```
Terminal -- vim -- 122x47
*****
*
* @file: examples/example_31_-_advertservice_ops.c
*
* @description:
*   example number 30: complete example for GATAdvertService
*
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 *
 *
 * "example_41_-_advertservice_ops.c" 230L, 8466C
```





Advert Management



Code

Example

vi example_41_-_advertsvice_ops.c

```
Terminal -- vim -- 122x47
/*****
 *
 * @file: examples/example_31_-_advertsvice_ops.c
 *
 * @description:
 *   example number 30: complete example for GATAdvertService
 *
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 *
 *****/
"example_41_-_advertsvice_ops.c" 230L, 8466C
```

Examine the code



Author's name



Advert Management



Code

Example

```
./example_41_-_advertiservice_ops
```

```
Terminal - tcsh - 122x47
[swlkw3099 :CAT/0.99.2/CATEngine-distrib-0.99.2-2004-06-20] kdavis% cd $CAT_LOCATION/./examples/
[swlkw3099 :0.99.2/CATEngine-distrib-0.99.2-2004-06-20/examples] kdavis% vi example_41_-_advertiservice_ops.c
[swlkw3099 :0.99.2/CATEngine-distrib-0.99.2-2004-06-20/examples] kdavis% ./example_41_-_advertiservice_ops
```





Job Management

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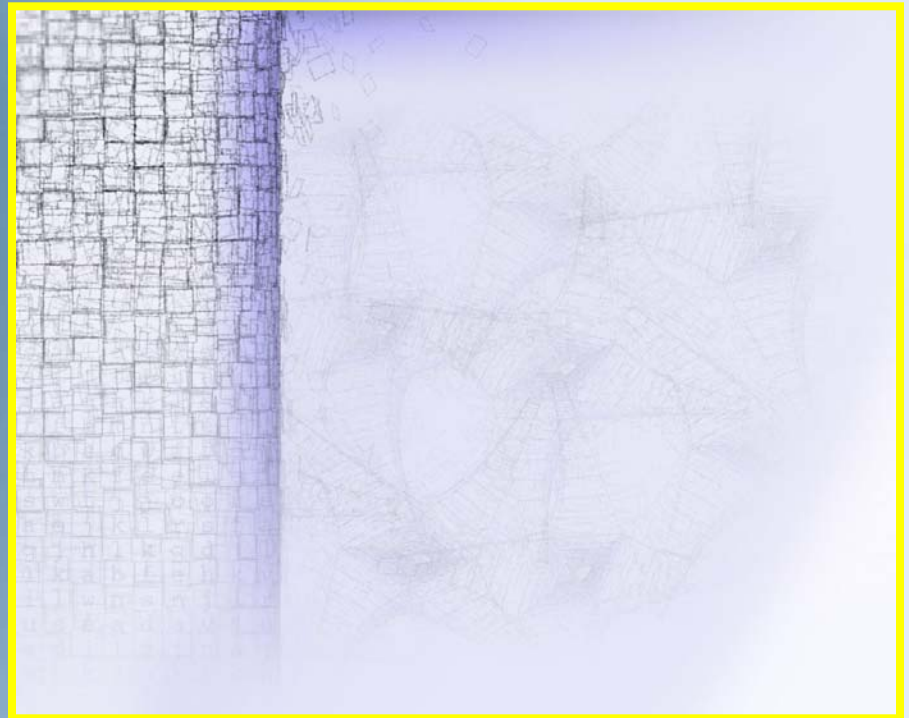


Job Management: Outline



- Job Package
 - Overview
 - GATResourceDescription's
 - GATResource's
 - GATResourceBroker
 - GATSoftwareDescription
 - GATJobDescription
 - GATJob

- Code
 - Example





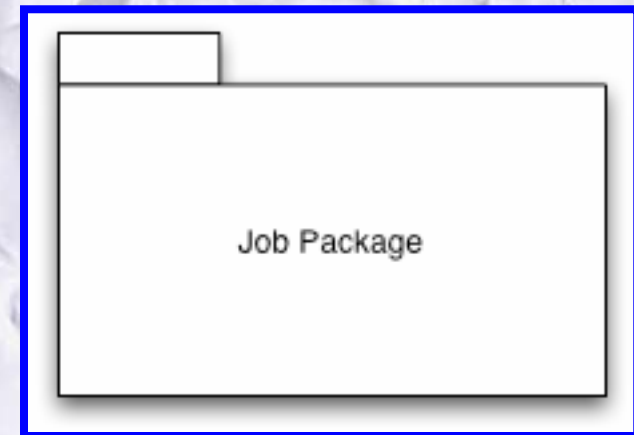
Job Management



Information Society
Technologies

- Job Package

The Job Package allows an application to obtain resource, reserve resources, and submit and manage jobs.





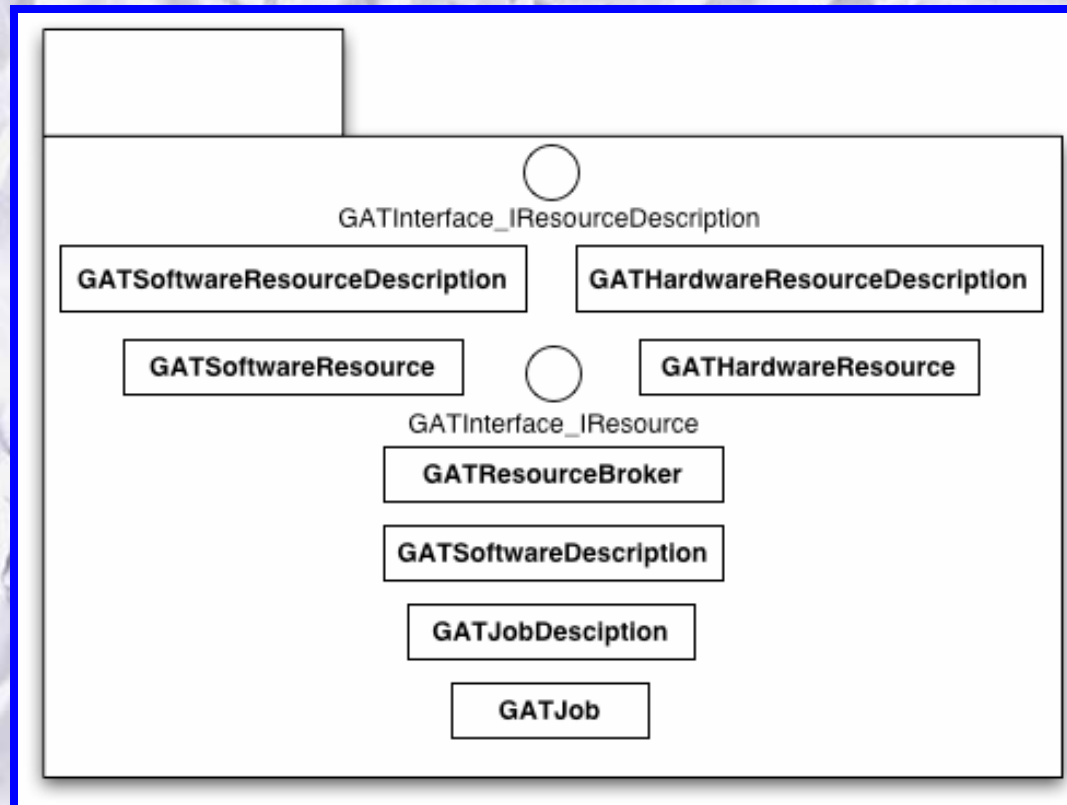
Job Management



Information Society
Technologies

- Job Package

...and consists of many classes and interfaces.





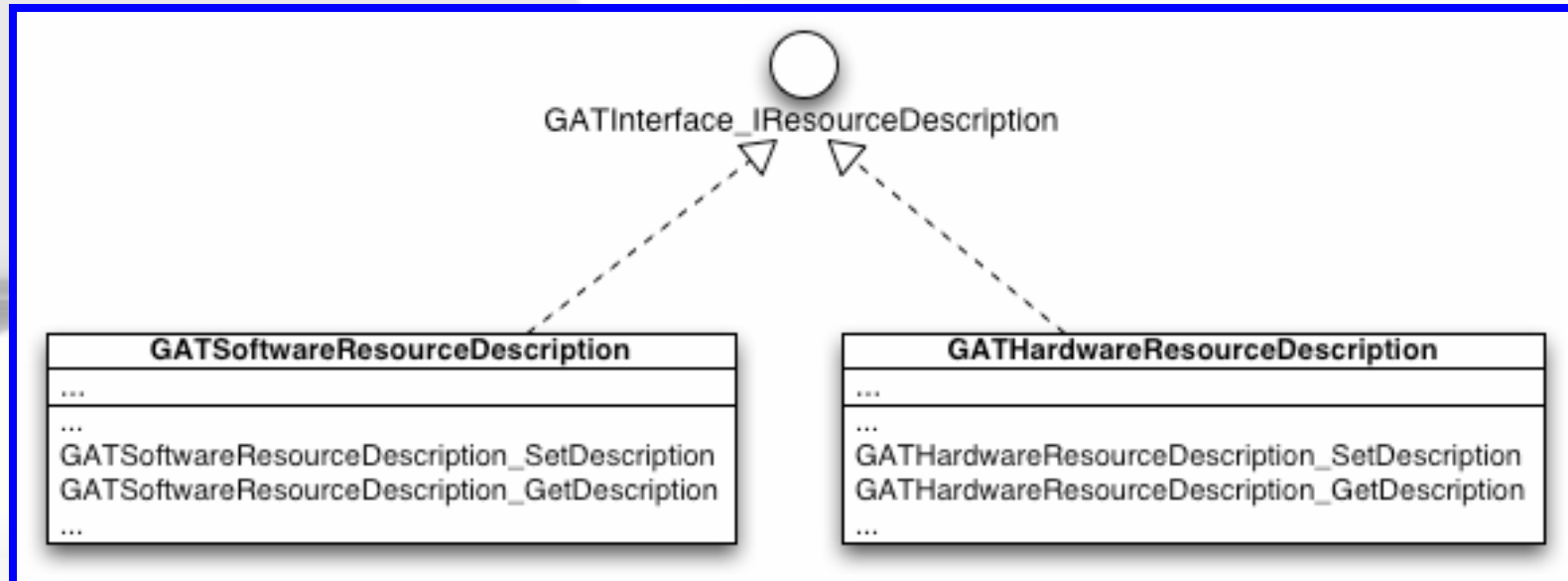
Job Management



Job Package

GATResourceDescription's

A `GATHardwareResourceDescription` describes a hardware resource, such as a Linux box with 1GB of memory. A `GATSoftwareResourceDescription` describes a software resource, such as an OS.





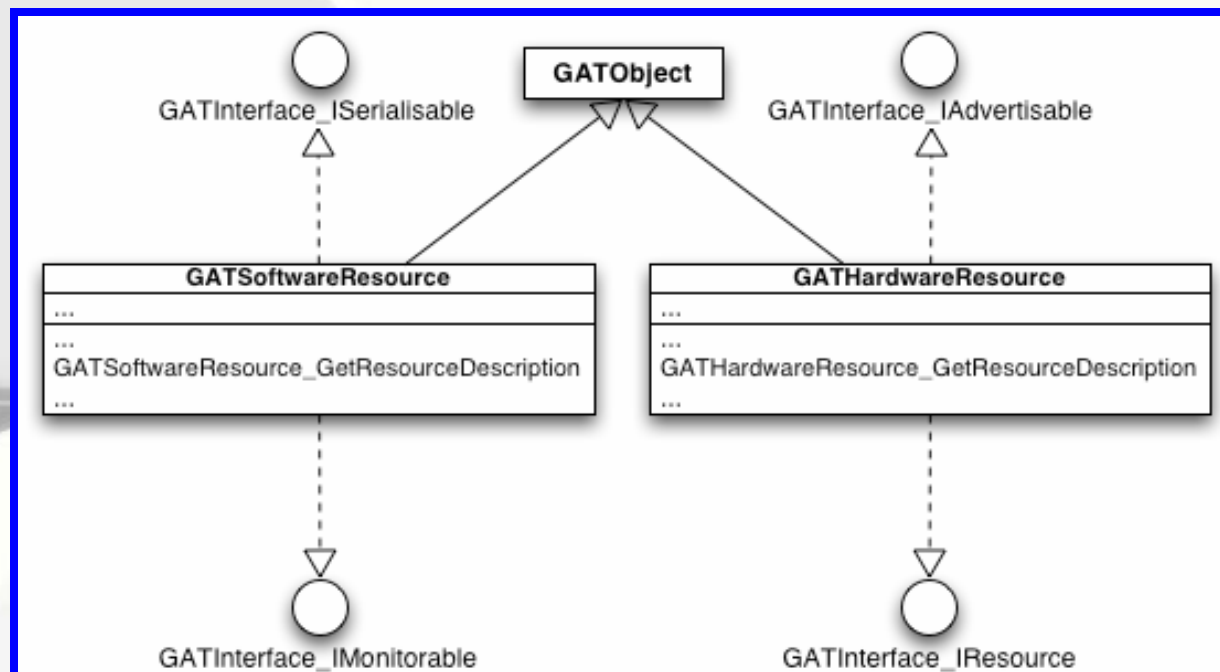
Job Management



Job Package

GATResource's

A `GATHardwareResource` represents a hardware resource, such as a Linux box with 1GB of memory. A `GATSoftwareResource` represents a software resource, such as a running OS.





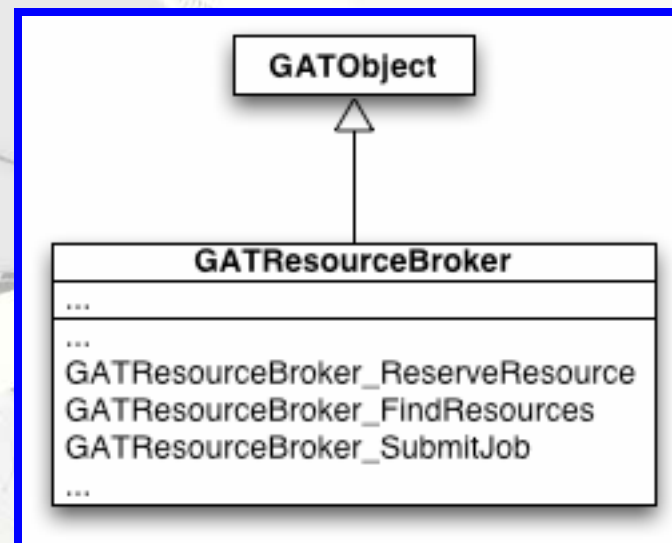
Job Management



Job Package

GATResourceBroker

A GATResourceBroker instance is able to broker resources, it can find or reserve resources; also, it can submit jobs to such resources.



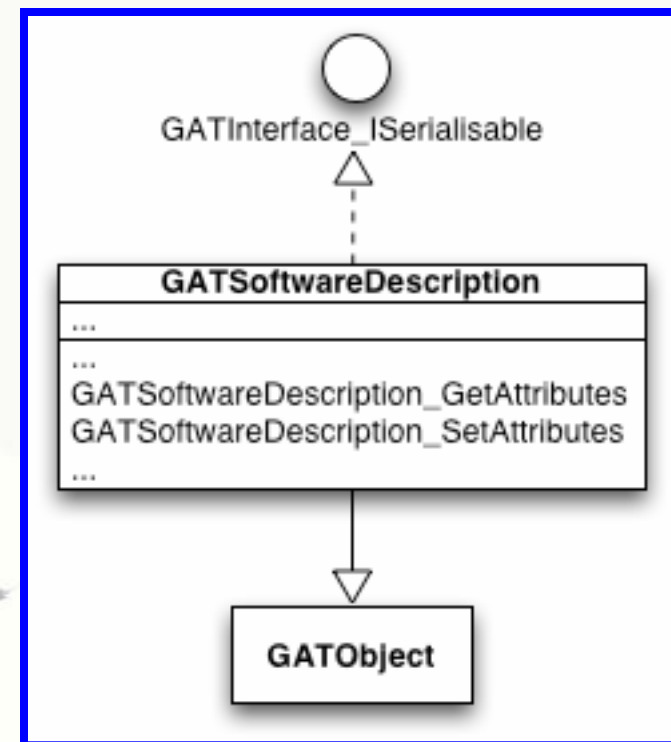


Job Management



- Job Package
 - GATSoftwareDescription

A GATSoftwareDescription instance describes an executable, for example /bin/date



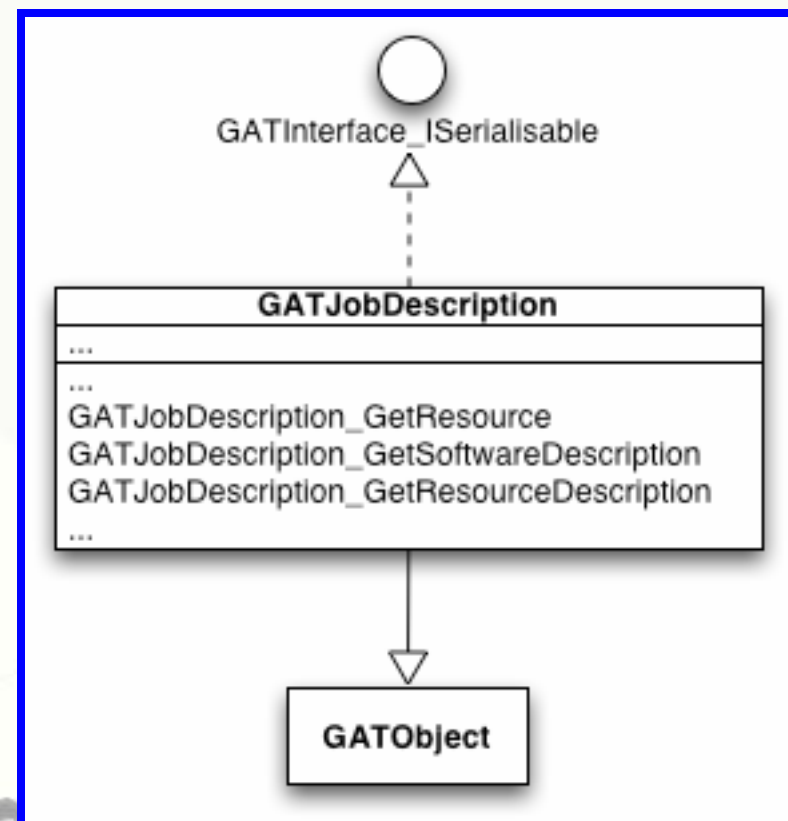


Job Management



- Job Package
 - GATJobDescription

A GATJobDescription instance describes a job which is can be executed. It includes a description of the hardware and software for the job.





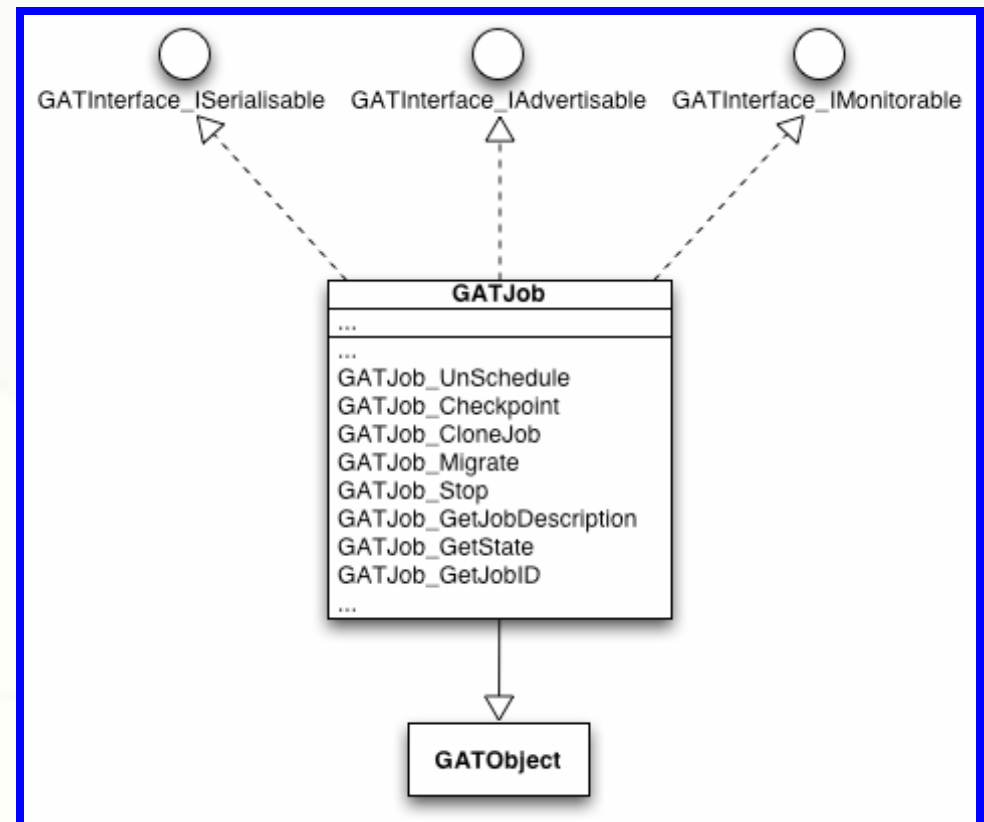
Job Management



Job Package

GATJob

A GATJob represents a job that has been submitted to a resource management system.





Job Management



● Code

● Example

```
cd $GAT_LOCATION/./examples
```

A terminal window titled "Terminal - tcsh - 122x47" showing the command execution. The prompt is "[shlw3099 .GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis%". The command "cd \$GAT_LOCATION/./examples/" has been entered and executed, resulting in a blank terminal screen.

```
Terminal - tcsh - 122x47
[shlw3099 .GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% cd $GAT_LOCATION/./examples/
```





Job Management



Code

Example

```
vi example_60_-_job_submit.c
```

```
Terminal - tcsh - 122x47
[swlkw3099 :GAT/0.99.2/GATEngineering-dist-ib-0.99.2-2004-06-20] kdavis% cd $GAT_LOCATION/./examples/
[swlkw3099 :0.99.2/GATEngineering-dist-ib-0.99.2-2004-06-20/examples] kdavis% vi example_60_-_job_submit.c
```





Job Management



● Code

● Example

vi example_60_-_job_submit.c

```
Terminal -- vim -- 122x47
/*****
 *
 * @file: examples/example_60_-_job_submit.c
 *
 * @description:
 *   submit the given binary as job to any resource.
 *
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 *
 *****/
"example_60_-_job_submit.c" 260L, 9504C
```



Apart Co. Author's name



Job Management



● Code

● Example

vi example_60_-_job_submit.c

```
Terminal -- vim -- 122x47
/*****
 *
 * @file: examples/example_60_-_job_submit.c
 *
 * @description:
 *   submit the given binary as job to any resource.
 *
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 *****/
"example_60_-_job_submit.c" 260L, 9504C
```

Examine the code



Author's name



Job Management



Code

Example

```
./example_60_-_job_submit/bin/date
```

```
Terminal - tcsh - 122x47
[swlkw3099 :GAT/0.99.2/GATEngine-distrib-0.99.2-2004-06-20] kdavis% cd $GAT_LOCATION/./examples/
[swlkw3099 :0.99.2/GATEngine-distrib-0.99.2-2004-06-20/examples] kdavis% vi example_60_-_job_submit.c
[swlkw3099 :0.99.2/GATEngine-distrib-0.99.2-2004-06-20/examples] kdavis% ./example_60_-_job_submit/bin/date
```





Endtroduction

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Author's name



Endtroduction



- **GAT** - The **G**rid **A**pplication **T**oolkit
 - Abstracts the Grid from application programmers
 - Gives application programmers a uniform Grid-API
 - Supports adaptors to plugin various grid technologies
- **GAT-API**
 - Simple to use
 - Supports major Grid functionalities

That's All Folks!

