
Subject: Re: Speed penalty using START and COUNT with HDF_SD_GETDATA
Posted by [Mark Hadfield](#) on Wed, 05 Sep 2001 05:52:35 GMT

[View Forum Message](#) <> [Reply to Message](#)

"Bob Fugate" <rqfugate@mindspring.com> wrote in message
news:B7BAF61A.2E03%rqfugate@mindspring.com...

> I have a large number of 128x128 pixel arrays stored as SDS's in
> HDF files. Since I am only interested in a 32x32 subset of each
> array, I tried using the START and COUNT keywords to read
> only that part of the array I need ---
> thinking this would be faster and less taxing on memory.
> However, I learned today that it is much faster to read
> in the entire array.
>
> ...
>
> This is a so-so Windows NT machine; IDL 5.4. The data is on a
> server. I have
> a good connection to the server.
>
> Anyone had any similar experiences

I have noticed something similar with IDL's netCDF interface: using the
STRIDE keyword seems to be very inefficient. I got the impression that IDL
is actually reading in the whole array then extracting a subset.

> ...suggestions on how to speed up reading
> only the part of the array I need?

Have you tried copying the file to a local disk? The local disk's caching
may suit the way IDL reads the data better.

Mark Hadfield
m.hadfield@niwa.cri.nz <http://katipo.niwa.cri.nz/~hadfield>
National Institute for Water and Atmospheric Research

--

Posted from clam.niwa.cri.nz [202.36.29.1]
via Mailgate.ORG Server - <http://www.Mailgate.ORG>

Subject: Re: Speed penalty using START and COUNT with HDF_SD_GETDATA

Mark Hadfield wrote:

```
>
> "Bob Fugate" <rqfugate@mindspring.com> wrote in message
> news:B7BAF61A.2E03%rqfugate@mindspring.com...
>> I have a large number of 128x128 pixel arrays stored as SDS's in
>> HDF files. Since I am only interested in a 32x32 subset of each
>> array, I tried using the START and COUNT keywords to read
>> only that part of the array I need ---
>> thinking this would be faster and less taxing on memory.
>> However, I learned today that it is much faster to read
>> in the entire array.
>>
>> ...
>>
>> This is a so-so Windows NT machine; IDL 5.4. The data is on a
>> server. I have
>> a good connection to the server.
>>
>> Anyone had any similar experiences
>
> I have noticed something similar with IDL's netCDF interface: using the
> STRIDE keyword seems to be very inefficient. I got the impression that IDL
> is actually reading in the whole array then extracting a subset.
>
>> ...suggestions on how to speed up reading
>> only the part of the array I need?
>
> Have you tried copying the file to a local disk? The local disk's caching
> may suit the way IDL reads the data better.
>
```

I believe both of you are using unlimited dimension.
In the past we did a lot of tests with data which is stored in
limited and unlimited dimensions.

During reading data in limited dimension is much much more faster,
I am not sure if I right remember but I believe about more than ten
times.

We often use netCDF reading only one parameter or some parameters by
count
and offset and this is very fast. (Much more faster as reading the whole
file)

I will explain what happens if you write with an unlimited dimension.

e.g.

DATA1 is 1 , 2, 3, 4, 5
DATA2 is 10,20,30,40,50

unlimited writes in this way

1,10,2,20,3,30,4,40,5,50

Then exactly this happens you both described.
The whole file or much of the file must be read in to read only some data.

if you write with limited dimensions the data is stored like

1,2,3,4,5,10,20,30,40,50

In this case only parts of the data must be read in.

We decided to write data with limited dimensions because normally they are once written but many times you like to read them as fast as possible.

hope this helps

regards
Reimar

--
Reimar Bauer

Institut fuer Stratosphaerische Chemie (ICG-1)
Forschungszentrum Juelich
email: R.Bauer@fz-juelich.de
<http://www.fz-juelich.de/icg/icg1/>

=====

a IDL library at Forschungszentrum Juelich
http://www.fz-juelich.de/icg/icg1/idl_icglib/idl_lib_intro.html

<http://www.fz-juelich.de/zb/text/publikation/juel3786.html>
=====

Subject: Re: Speed penalty using START and COUNT with HDF_SD_GETDATA
Posted by [Bob Fugate](#) on Wed, 05 Sep 2001 11:13:27 GMT
[View Forum Message](#) <> [Reply to Message](#)

Reimar,
I don't have any control over how the data are written or stored. How can I do what you suggest? I am doing something like the following now (assumes there are 8000 frames in the SDS):

```
hdf_sd_getdata,arrayid,data,start=[46,43,0],count=[32,32,800 0]
```

where the first two numbers are the indices where I want to start extracting the data from the 128x128 array and 32 is the size of the extracted array.
The above is much slower than

```
hdf_sd_getdata,arrayid,data
```

or even

```
hdf_sd_getdata,arrayid,data,start=[0,0,0],count=[128,128,800 0]
```

Can you make a specific suggestion as to how I can use 'limited dimension' in this context?

Thanks

```
> From: Reimar Bauer <r.bauer@fz-juelich.de>
> Organization: Forschungszentrum Juelich GmbH
> Newsgroups: comp.lang.idl-pvwave
> Date: Wed, 05 Sep 2001 09:35:55 +0200
> Subject: Re: Speed penalty using START and COUNT with HDF_SD_GETDATA
>
> Mark Hadfield wrote:
>>
>> "Bob Fugate" <rqfugate@mindspring.com> wrote in message
>> news:B7BAF61A.2E03%rqfugate@mindspring.com...
>>> I have a large number of 128x128 pixel arrays stored as SDS's in
>>> HDF files. Since I am only interested in a 32x32 subset of each
>>> array, I tried using the START and COUNT keywords to read
>>> only that part of the array I need ---
>>> thinking this would be faster and less taxing on memory.
>>> However, I learned today that it is much faster to read
>>> in the entire array.
```

>>>
>>> ...
>>>
>>> This is a so-so Windows NT machine; IDL 5.4. The data is on a
>>> server. I have
>>> a good connection to the server.
>>>
>>> Anyone had any similar experiences
>>
>> I have noticed something similar with IDL's netCDF interface: using the
>> STRIDE keyword seems to be very inefficient. I got the impression that IDL
>> is actually reading in the whole array then extracting a subset.
>>
>>> ...suggestions on how to speed up reading
>>> only the part of the array I need?
>>
>> Have you tried copying the file to a local disk? The local disk's caching
>> may suit the way IDL reads the data better.
>>
>
>
> I believe both of you are using unlimited dimension.
> In the past we did a lot of tests with data which is stored in
> limited and unlimited dimensions.
>
> During reading data in limited dimension is much much more faster,
> I am not sure if I right remember but I believe about more than ten
> times.
>
> We often use netCDF reading only one parameter or some parameters by
> count
> and offset and this is very fast. (Much more faster as reading the whole
> file)
>
> I will explain what happens if you write with an unlimited dimension.
>
> e.g.
>
> DATA1 is 1 , 2, 3, 4, 5
> DATA2 is 10,20,30,40,50
>
>
> unlimited writes in this way
>
> 1,10,2,20,3,30,4,40,5,50
>
> Then exactly this happens you both described.
> The whole file or much of the file must be read in to read only some

> data.
>
>
> if you write with limited dimensions the data is stored like
>
> 1,2,3,4,5,10,20,30,40,50
>
> In this case only parts of the data must be read in.
>
> We decided to write data with limited dimensions because normally they
> are
> once written but many times you like to read them as fast as possible.
>
>
> hope this helps
>
>
> regards
> Reimar
>
>
>
> --
> Reimar Bauer
>
> Institut fuer Stratosphaerische Chemie (ICG-1)
> Forschungszentrum Juelich
> email: R.Bauer@fz-juelich.de
> http://www.fz-juelich.de/icg/icg1/
> =====
> a IDL library at Forschungszentrum Juelich
> http://www.fz-juelich.de/icg/icg1/idl_icglib/idl_lib_intro.html
>
> http://www.fz-juelich.de/zb/text/publikation/juel3786.html
> =====
>
> read something about linux / windows
> http://www.suse.de/de/news/hotnews/MS.html

Subject: Re: Speed penalty using START and COUNT with HDF_SD_GETDATA
Posted by [R.Bauer](#) on Wed, 05 Sep 2001 15:44:46 GMT
[View Forum Message](#) <> [Reply to Message](#)

Bob Fugate wrote:

>
> Reimar,
> I don't have any control over how the data are written or stored. How can I

> do what you suggest? I am doing something like the following now (assumes
 > there are 8000 frames in the SDS):
 >
 > hdf_sd_getdata,arrayid,data,start=[46,43,0],count=[32,32,800 0]
 >
 > where the first two numbers are the indices where I want to start extracting
 > the data from the 128x128 array and 32 is the size of the extracted array.
 > The above is much slower than
 >
 > hdf_sd_getdata,arrayid,data
 >
 > or even
 >
 > hdf_sd_getdata,arrayid,data,start=[0,0,0],count=[128,128,800 0]
 >
 > Can you make a specific suggestion as to how I can use 'limited dimension'
 > in this context?
 >
 > Thanks

Ok,
 I try to explain.

The first procedure creates two datasets with two different dimensions.
 The dimension of var1 is unlimited this is done by the [0] argument.
 And var2 has the dimension of 10.

PRO create_data_dims

```
sd_id = HDF_SD_START('test.hdf', /CREATE)
; Create an dataset that includes an unlimited dimension:
sds_id = HDF_SD_CREATE(sd_id, 'var1', [0], /SHORT)
sds_id = HDF_SD_CREATE(sd_id, 'var2', [10], /SHORT)
HDF_SD_ENDACCESS, sds_id
HDF_SD_END, SD_ID
```

END

The second procedure reads the dimensions of the data and
 you get something like this back.

```
VAR1      0
VAR2      10
```

PRO read_data_dims

```

sd_id = HDF_SD_START('test.hdf')

index = HDF_SD_NAMETOINDEX(sd_id, 'var1')
sds_id=HDF_SD_SELECT(sd_id,index)
HDF_SD_GETINFO, SDS_ID,dims=dim
PRINT,'VAR1',dim
HDF_SD_ENDACCESS, sds_id

index = HDF_SD_NAMETOINDEX(sd_id, 'var2')
sds_id=HDF_SD_SELECT(sd_id,index)
HDF_SD_GETINFO, SDS_ID,dims=dim
PRINT,'VAR2',dim
HDF_SD_ENDACCESS, sds_id

HDF_SD_END, SD_ID
END

```

If you exchange test.hdf and the varnames to one of your files you can examine if the last dimension is 0. This means unlimited dimension.

If you found unlimited dimensions then one of the possibilities is to read in the whole set and store it with limited dimensions.

Only by writing the decision between limited and unlimited could be done.

If you don't have routines yourself for this I can share some of our routines.

regards
Reimar

```

>
>> From: Reimar Bauer <r.bauer@fz-juelich.de>
>> Organization: Forschungszentrum Juelich GmbH
>> Newsgroups: comp.lang.idl-pvwave
>> Date: Wed, 05 Sep 2001 09:35:55 +0200
>> Subject: Re: Speed penalty using START and COUNT with HDF_SD_GETDATA
>>
>> Mark Hadfield wrote:
>>>
>>> "Bob Fugate" <rqfugate@mindspring.com> wrote in message
>>> news:B7BAF61A.2E03%rqfugate@mindspring.com...

```

>>>> I have a large number of 128x128 pixel arrays stored as SDS's in
>>>> HDF files. Since I am only interested in a 32x32 subset of each
>>>> array, I tried using the START and COUNT keywords to read
>>>> only that part of the array I need ---
>>>> thinking this would be faster and less taxing on memory.
>>>> However, I learned today that it is much faster to read
>>>> in the entire array.
>>>>
>>>> ...
>>>>
>>>> This is a so-so Windows NT machine; IDL 5.4. The data is on a
>>>> server. I have
>>>> a good connection to the server.
>>>>
>>>> Anyone had any similar experiences
>>>
>>> I have noticed something similar with IDL's netCDF interface: using the
>>> STRIDE keyword seems to be very inefficient. I got the impression that IDL
>>> is actually reading in the whole array then extracting a subset.
>>>
>>>> ...suggestions on how to speed up reading
>>>> only the part of the array I need?
>>>
>>> Have you tried copying the file to a local disk? The local disk's caching
>>> may suit the way IDL reads the data better.
>>>
>>
>>
>> I believe both of you are using unlimited dimension.
>> In the past we did a lot of tests with data which is stored in
>> limited and unlimited dimensions.
>>
>> During reading data in limited dimension is much much more faster,
>> I am not sure if I right remember but I believe about more than ten
>> times.
>>
>> We often use netCDF reading only one parameter or some parameters by
>> count
>> and offset and this is very fast. (Much more faster as reading the whole
>> file)
>>
>> I will explain what happens if you write with an unlimited dimension.
>>
>> e.g.
>>
>> DATA1 is 1 , 2, 3, 4, 5
>> DATA2 is 10,20,30,40,50
>>

```
>>
>> unlimited writes in this way
>>
>> 1,10,2,20,3,30,4,40,5,50
>>
>> Then exactly this happens you both described.
>> The whole file or much of the file must be read in to read only some
>> data.
>>
>>
>> if you write with limited dimensions the data is stored like
>>
>> 1,2,3,4,5,10,20,30,40,50
>>
>> In this case only parts of the data must be read in.
>>
>> We decided to write data with limited dimensions because normally they
>> are
>> once written but many times you like to read them as fast as possible.
>>
>>
>> hope this helps
>>
>>
>> regards
>> Reimar
>>
>>
>> --
>> Reimar Bauer
>>
>> Institut fuer Stratosphaerische Chemie (ICG-1)
>> Forschungszentrum Juelich
>> email: R.Bauer@fz-juelich.de
>> http://www.fz-juelich.de/icg/icg1/
>> =====
>> a IDL library at ForschungsZentrum Juelich
>> http://www.fz-juelich.de/icg/icg1/idl_icglib/idl_lib_intro.h tml
>>
>> http://www.fz-juelich.de/zb/text/publikation/juel3786.html
>> =====
>>
>> read something about linux / windows
>> http://www.suse.de/de/news/hotnews/MS.html
>>
>>
--
Reimar Bauer
```

Institut fuer Stratosphaerische Chemie (ICG-1)
Forschungszentrum Juelich
email: R.Bauer@fz-juelich.de
<http://www.fz-juelich.de/icg/icg1/>

=====

a IDL library at Forschungszentrum Juelich
http://www.fz-juelich.de/icg/icg1/idl_icglib/idl_lib_intro.html

<http://www.fz-juelich.de/zb/text/publikation/juel3786.html>
=====

read something about linux / windows
<http://www.suse.de/de/news/hotnews/MS.html>

Subject: Re: Speed penalty using START and COUNT with HDF_SD_GETDATA
Posted by [Mark Hadfield](#) on Thu, 06 Sep 2001 00:19:48 GMT
[View Forum Message](#) <> [Reply to Message](#)

From: "Reimar Bauer" <r.bauer@fz-juelich.de>
> Mark Hadfield wrote:
>> "Bob Fugate" <rqfugate@mindspring.com> wrote in message
> ...
> I believe both of you are using unlimited dimension.

I wasn't referring to subsampling data along an unlimited dimension and
neither (as far as I can tell) was Bob.

> During reading data in limited dimension is much much more faster,

Yes, I have found that. It becomes a significant problem when there is a
large number of records, each containing a small amount of data.

Mark Hadfield
m.hadfield@niwa.cri.nz <http://katipo.niwa.cri.nz/~hadfield>
National Institute for Water and Atmospheric Research

--

Posted from clam.niwa.cri.nz [202.36.29.1]
via Mailgate.ORG Server - <http://www.Mailgate.ORG>

Subject: Re: Speed penalty using START and COUNT with HDF_SD_GETDATA
Posted by [Mark Hadfield](#) on Thu, 06 Sep 2001 00:29:31 GMT
[View Forum Message](#) <> [Reply to Message](#)

From: "Bob Fugate" <rfugate@mindspring.com>

> I don't have any control over how the data are written or stored. How can
I
> do what you suggest? I am doing something like the following now (assumes
> there are 8000 frames in the SDS):
>
> hdf_sd_getdata,arrayid,data,start=[46,43,0],count=[32,32,800 0]
>
> where the first two numbers are the indices where I want to start
extracting
> the data from the 128x128 array and 32 is the size of the extracted array.
> The above is much slower than
>
> hdf_sd_getdata,arrayid,data
>
> or even
>
> hdf_sd_getdata,arrayid,data,start=[0,0,0],count=[128,128,800 0]

One strategy you might consider is

```
data = fltarr(32,32,8000)
for i=0,7999 do begin
    hdf_sd_getdata,arrayid, frame, start=[0,0,i], count=[128,128,1]
    data[*,* ,i] = frame[46:77,43:74,0]
endfor
```

The motivation for this is that reading data along the final dimension is slow in any case (for reasons explained by Reimar) so the loop won't hurt you too much. By reading a full frame of data on each step you are reading contiguous data, which is fast. And by looping you avoid having to store large amounts of unneeded data.

But test it for yourself!

Mark Hadfield
m.hadfield@niwa.cri.nz <http://katipo.niwa.cri.nz/~hadfield>
National Institute for Water and Atmospheric Research

--

Posted from clam.niwa.cri.nz [202.36.29.1]
via Mailgate.ORG Server - <http://www.Mailgate.ORG>

Subject: Re: Speed penalty using START and COUNT with HDF_SD_GETDATA
Posted by [Bob Fugate](#) on Sat, 08 Sep 2001 15:29:10 GMT

[View Forum Message](#) <> [Reply to Message](#)

```
> One strategy you might consider is
>
> data = fltarr(32,32,8000)
> for i=0,7999 do begin
>   hdf_sd_getdata,arrayid, frame, start=[0,0,i], count=[128,128,1]
>   data[:,*,i] = frame[46:77,43:74,0]
> endfor
>
> The motivation for this is that reading data along the final dimension is
> slow in any case (for reasons explained by Reimar) so the loop won't hurt
> you too much. By reading a full frame of data on each step you are reading
> contiguous data, which is fast. And by looping you avoid having to store
> large amounts of unneeded data.
>
> But test it for yourself!
>
> ---
> Mark Hadfield
> m.hadfield@niwa.cri.nz http://katipo.niwa.cri.nz/~hadfield
> National Institute for Water and Atmospheric Research
```

Thanks to Mark and Reimar for the suggestions. The SDS's are definitely dimensioned, so I am not sub-sampling an array having dimensions=[0]. I have settled on reading the entire 128x128 array and then extracting the part I need. It turns out that I have enough RAM to read the entire 8000 frames without using a loop as you suggest above, Mark, so the whole operation is fast.

Thanks again for your help.

Bob
