API Enhancements in Vault 2019

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About the speaker

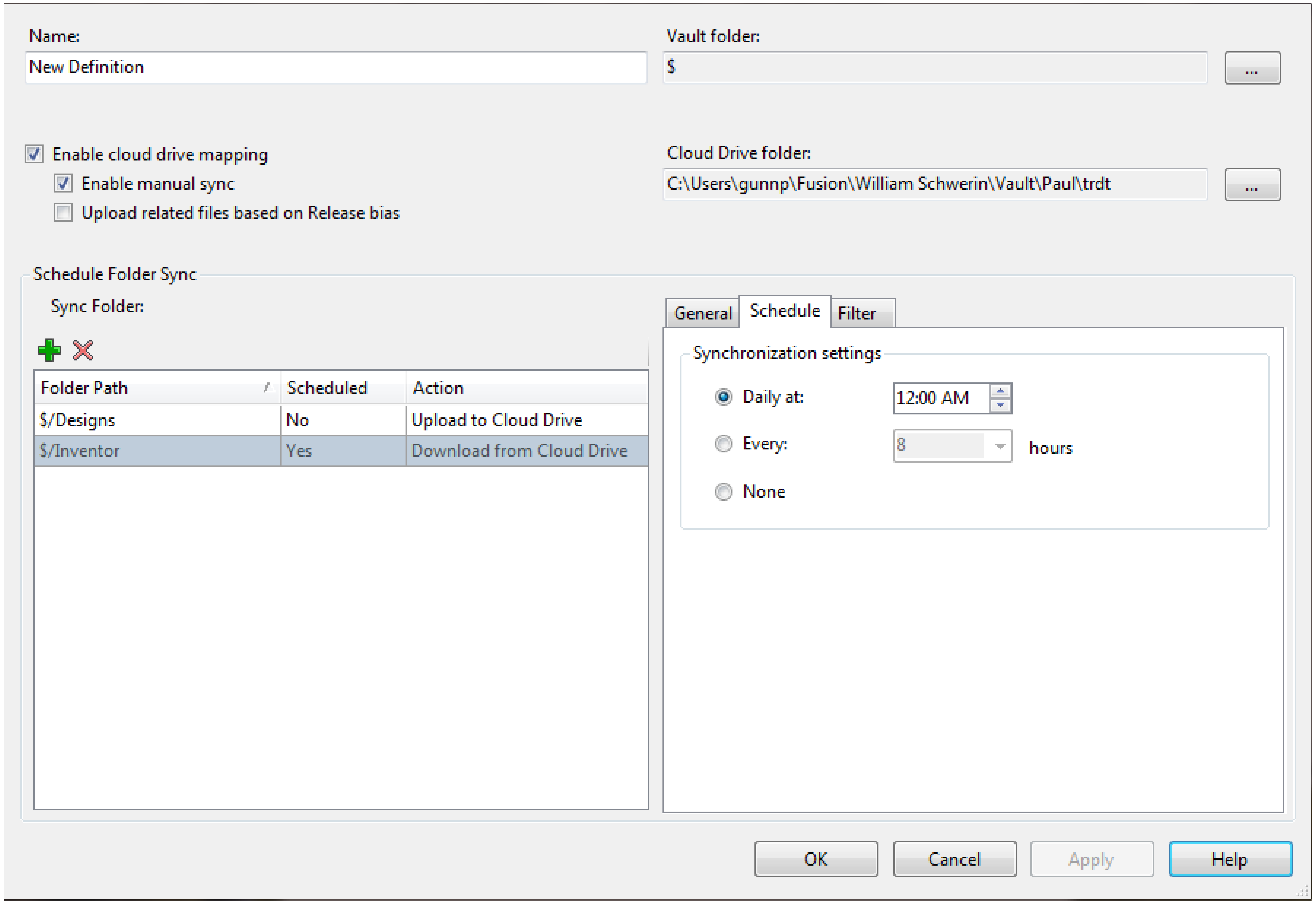
Paul Gunn

Paul has been a member of the Vault team since 2003. Throughout that time, he has been involved in the development of many features of the product including security, search, and replication with a focus on server-side functionality. Paul currently serves as a software architect for Vault.

Learning Objectives

- Learn about new API functionality available in Vault 2019
- Discover how this functionality was used to implement Project Sync
- Understand how these capabilities can be used in a custom application
- See the code behind and understand how it works

What is Project Sync?



Name: New Definition

Vault folder: $

☑ Enable cloud drive mapping

☑ Enable manual sync

☐ Upload related files based on Release bias

Cloud Drive folder: C:\Users\gunnp\Fusion\William Schwerin\Vault\Paul\trdt

Schedule Folder Sync

Sync Folder:

Folder Path	Scheduled	Action
$/Designs	No	Upload to Cloud Drive
$/Inventor	Yes	Download from Cloud Drive

General | Schedule | Filter

Synchronization settings

● Daily at: 12:00 AM

○ Every: 8 hours

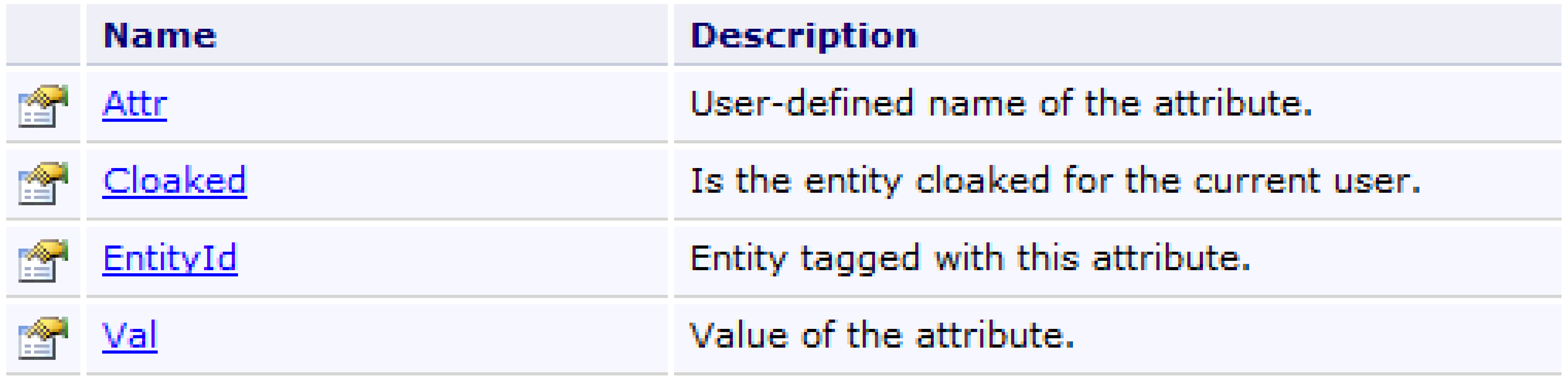
○ None

How is sync configuration stored?

Entity attributes overview

- Entity Attributes allow data to be programmatically associated with any entity
- This data is not directly user-visible and can be applied to read-only entities
- These are not considered part of history so do not create new file versions
- Attributes are in a user-defined namespace so multiple usages don’t collide

Entity attribute object (EntAttr)



	Name	Description
	Attr	User-defined name of the attribute.
	Cloaked	Is the entity cloaked for the current user.
	EntityId	Entity tagged with this attribute.
	Val	Value of the attribute.

Entity attributes API

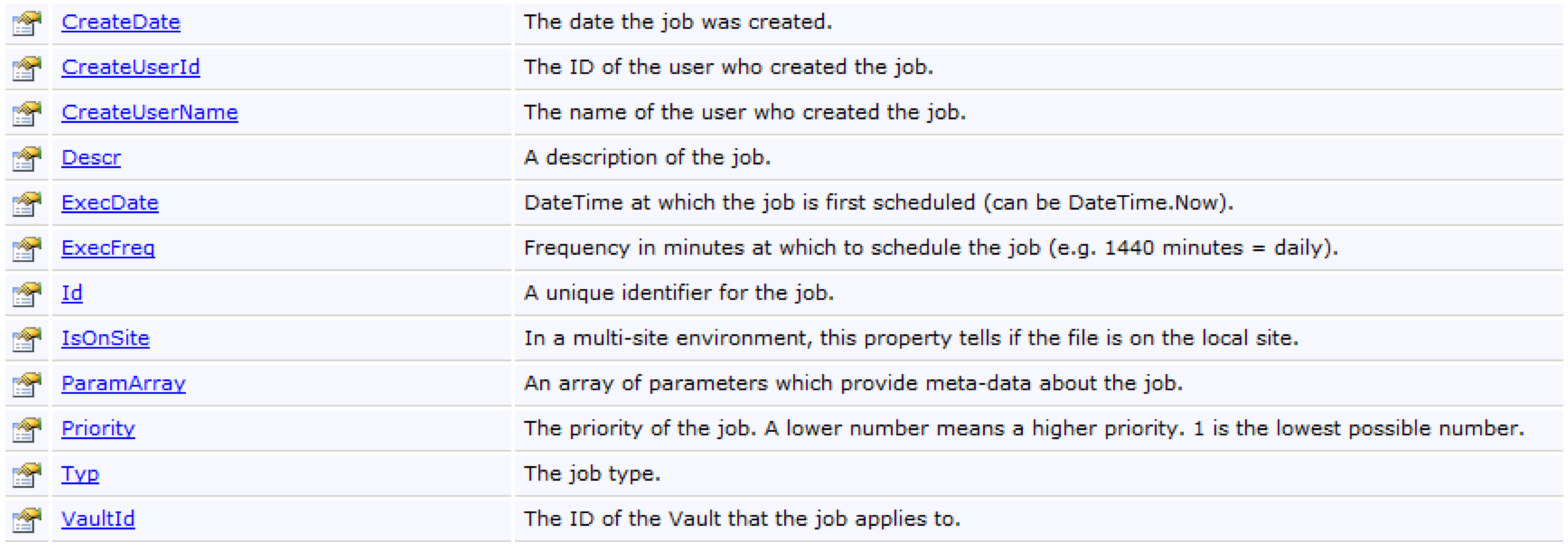
- void SetEntityAttribute(long entityId, string namespc, string attribute, string val)
  - Sets a named attribute on a given entity. A null val will delete an existing attribute.
- EntAttr[] GetEntityAttributes(long entityId, string namespc)
  - Gets all entity attributes associated with a given entity.
- EntAttr[] FindEntityAttributes(string namespc, string attribute);
  - Finds all entity attributes with a given attribute name.
- EntAttr[] FindAllEntityAttributes(string namespc)
  - Finds all entity attributes in the given namespace.

How are sync jobs scheduled?

Scheduled jobs overview

- Legacy functionality supports adding job for one-time, immediate execution
- New functionality supports scheduling a recurring job to run at a given cadence
- At scheduled times, a traditional job is added to the queue for normal execution / consumption
- Scheduled jobs can be viewed with other background tasks in ADMS console

Scheduled job object (SchedJob)



CreateDate	The date the job was created.
CreateUserId	The ID of the user who created the job.
CreateUserName	The name of the user who created the job.
Descr	A description of the job.
ExecDate	DateTime at which the job is first scheduled (can be DateTime.Now).
ExecFreq	Frequency in minutes at which to schedule the job (e.g. 1440 minutes = daily).
Id	A unique identifier for the job.
IsOnSite	In a multi-site environment, this property tells if the file is on the local site.
ParamArray	An array of parameters which provide meta-data about the job.
Priority	The priority of the job. A lower number means a higher priority. 1 is the lowest possible number.
Typ	The job type.
VaultId	The ID of the Vault that the job applies to.

Scheduled job API

- SchedJob AddScheduledJob(string type, string desc, JobParam[] paramArray, int priority, System.DateTime execDate, int execFreqInMinutes)
    - Adds a scheduled job with given execution date and frequency
- void DeleteScheduledJob(long id)
    - Deletes the given scheduled job
- SchedJob GetScheduledJob(long id)
    - Gets information about the given scheduled job
- SchedJob[] GetScheduledJobs()
    - Gets information about all scheduled jobs

Vault Notification Sample

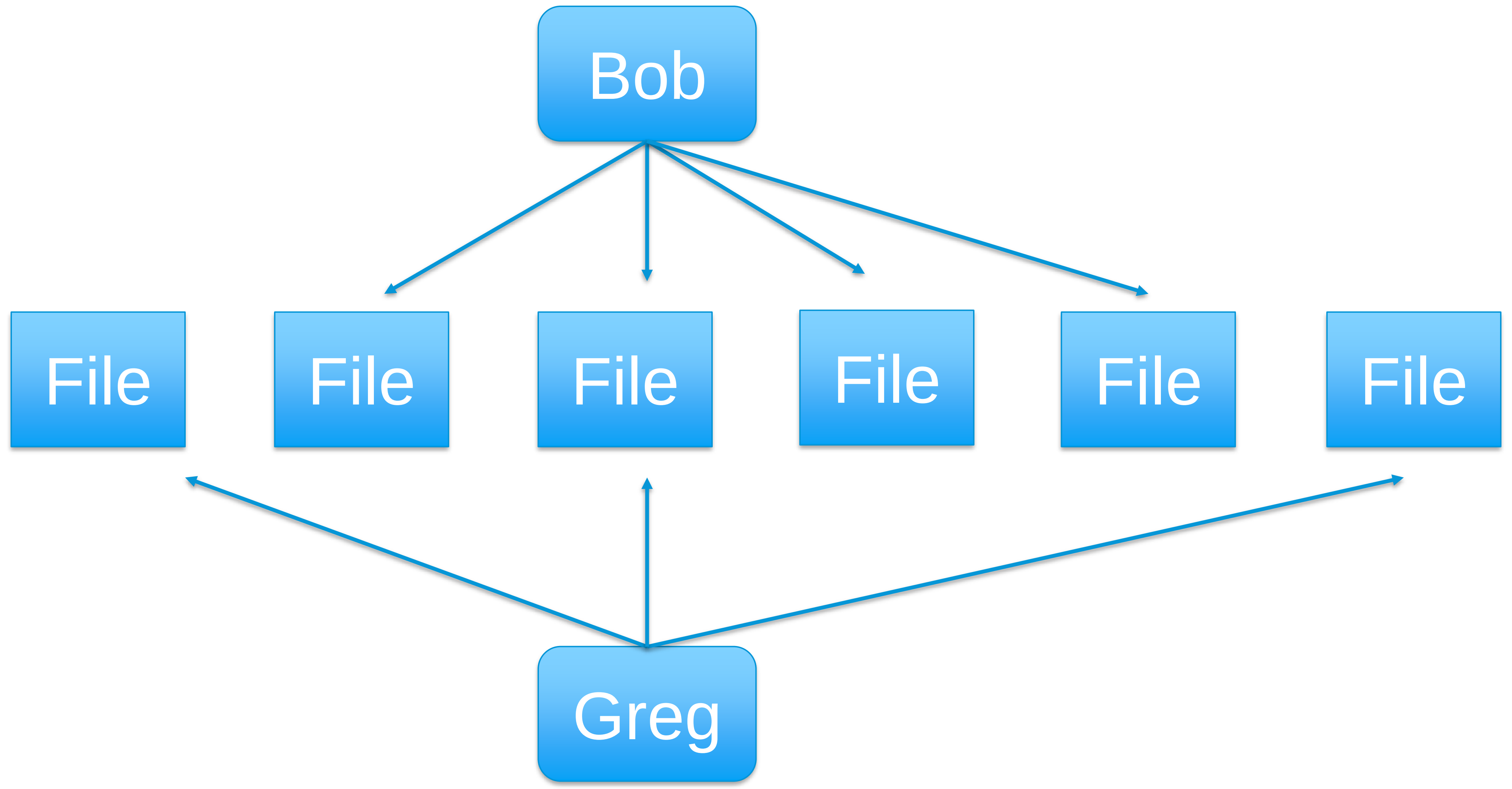
Demo

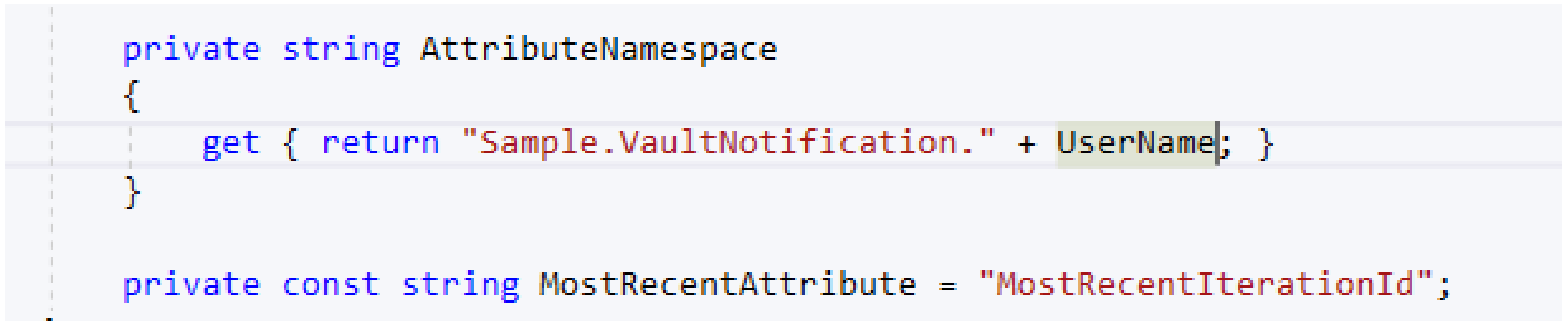
Limitations of the Sample Application

- Email
  - Assumes the email SMTP server is on ‘localhost’
  - Assumes the email addresses for vault user have been correctly configured
- Job Scheduling
  - A different scheduled job is created for each user, which could be inefficient
  - The user must have permissions to create a scheduled job
- Fit and finish
  - There are no options for including file dependencies and drawings
  - Integration with Vault Explorer via command extension

How is the notification list stored?

Design of the notification list

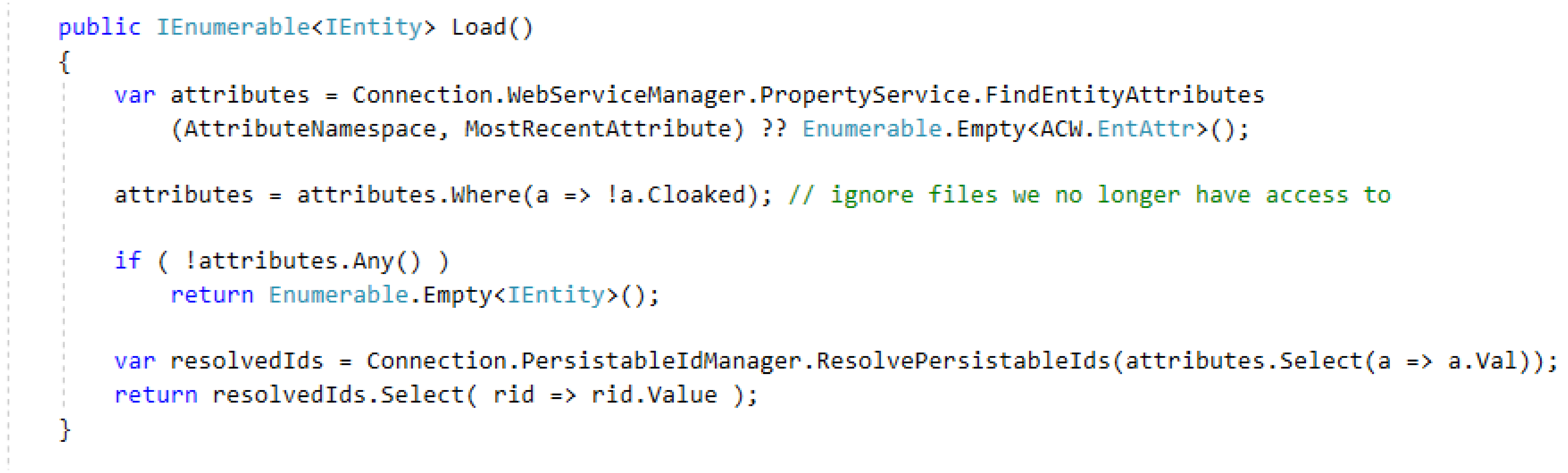




```
private string AttributeNamespace
{
    get { return "Sample.VaultNotification." + UserName; }
}

private const string MostRecentAttribute = "MostRecentIterationId";
```

Loading the notification list



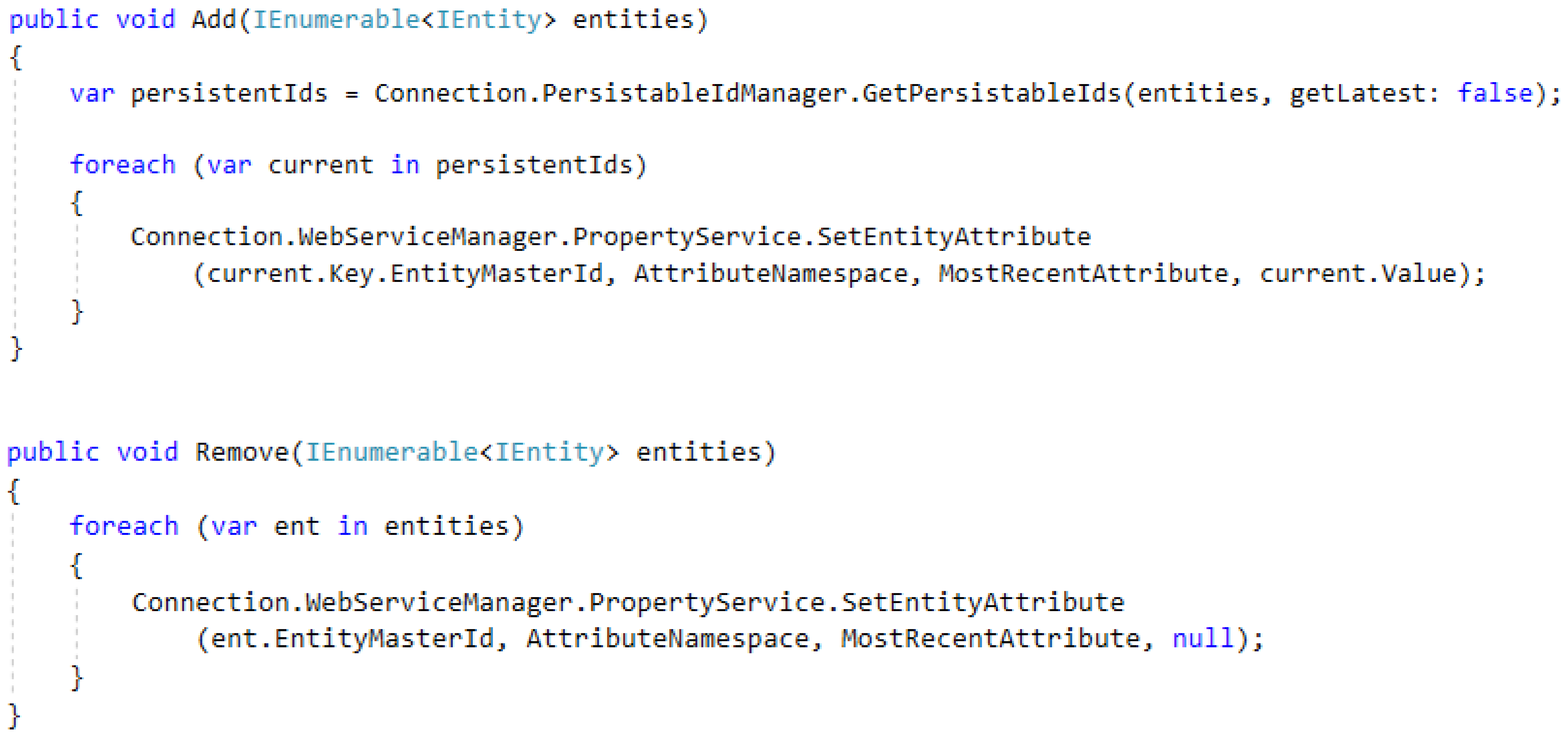
```
public IEnumerable<IEntity> Load()
{
    var attributes = Connection.WebServiceManager.PropertyService.FindEntityAttributes
        (AttributeNamespace, MostRecentAttribute) ?? Enumerable.Empty<ACW.EntAttr>();

    attributes = attributes.Where(a => !a.Cloaked); // ignore files we no longer have access to

    if ( !attributes.Any() )
        return Enumerable.Empty<IEntity>();

    var resolvedIds = Connection.PersistableIdManager.ResolvePersistableIds(attributes.Select(a => a.Val));
    return resolvedIds.Select( rid => rid.Value );
}
```

Modifying the notification list

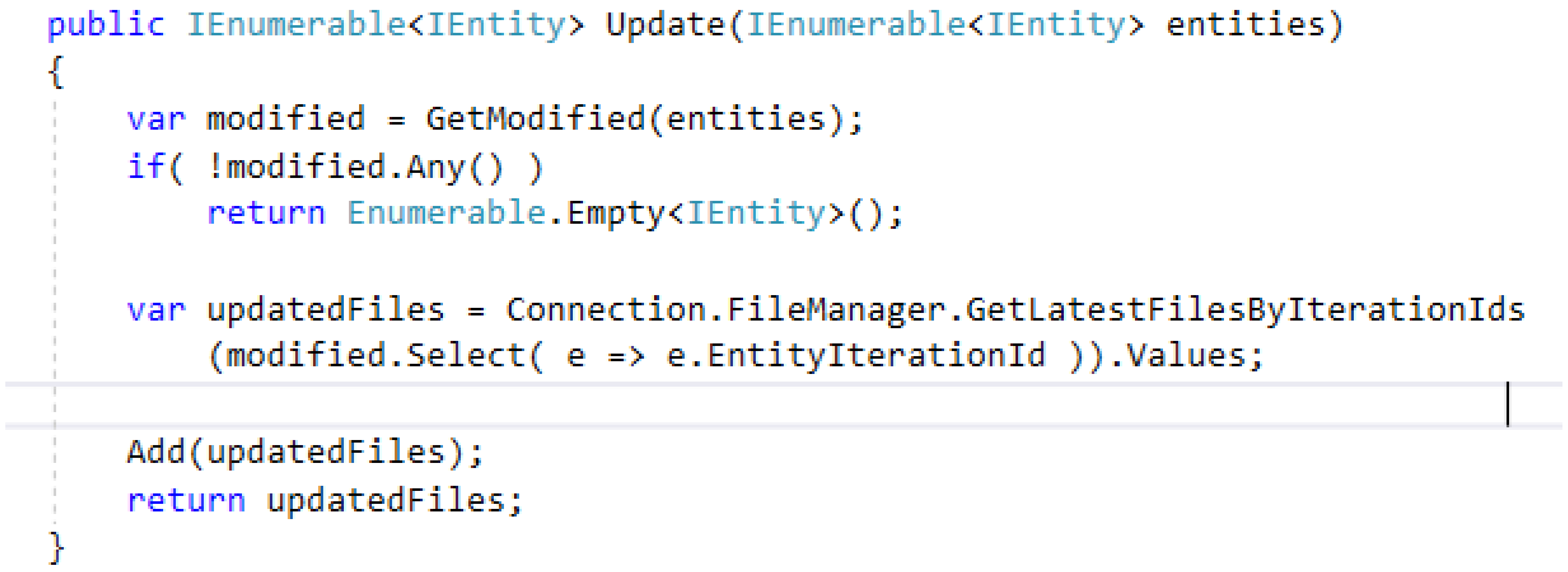


```
public void Add(IEnumerable<IEntity> entities)
{
    var persistentIds = Connection.PersistableIdManager.GetPersistableIds(entities, getLatest: false);

    foreach (var current in persistentIds)
    {
        Connection.WebServiceManager.PropertyService.SetEntityAttribute
            (current.Key.EntityMasterId, AttributeNamespace, MostRecentAttribute, current.Value);
    }
}


public void Remove(IEnumerable<IEntity> entities)
{
    foreach (var ent in entities)
    {
        Connection.WebServiceManager.PropertyService.SetEntityAttribute
            (ent.EntityMasterId, AttributeNamespace, MostRecentAttribute, null);
    }
}
```

Updating the notification list



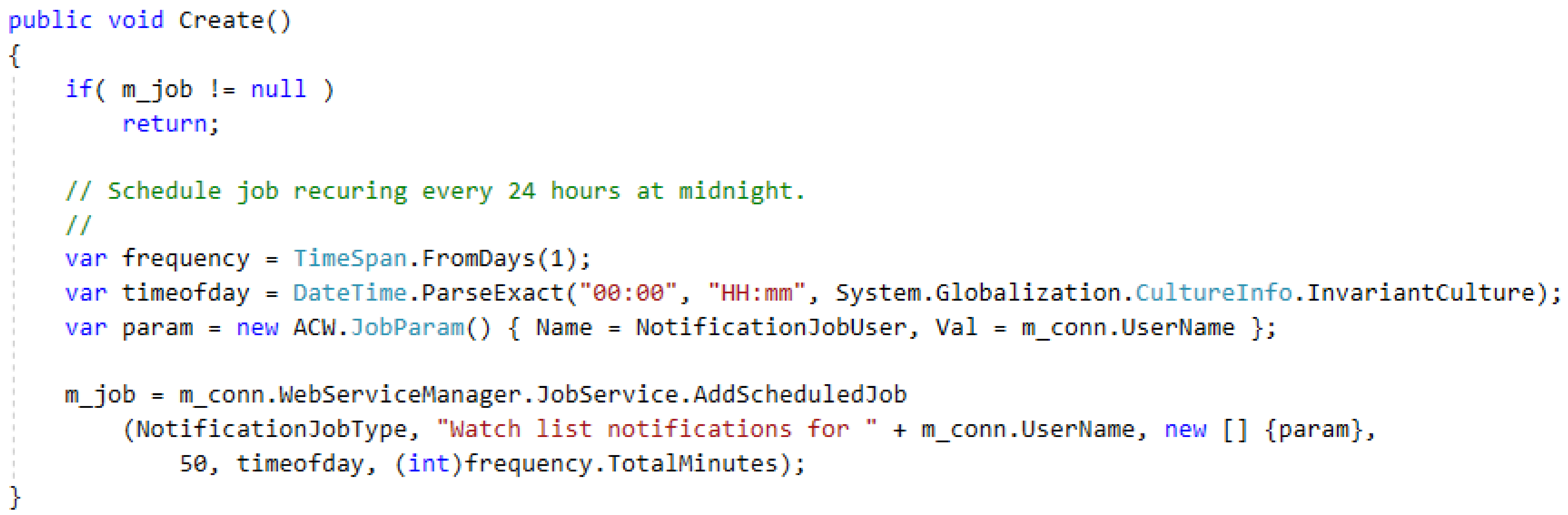
```
public IEnumerable<IEntity> Update(IEnumerable<IEntity> entities)
{
    var modified = GetModified(entities);
    if( !modified.Any() )
        return Enumerable.Empty<IEntity>();

    var updatedFiles = Connection.FileManager.GetLatestFilesByIterationIds
        (modified.Select( e => e.EntityIterationId )).Values;

    Add(updatedFiles);
    return updatedFiles;
}
```

How is does the notification job work?

Scheduling the notification job

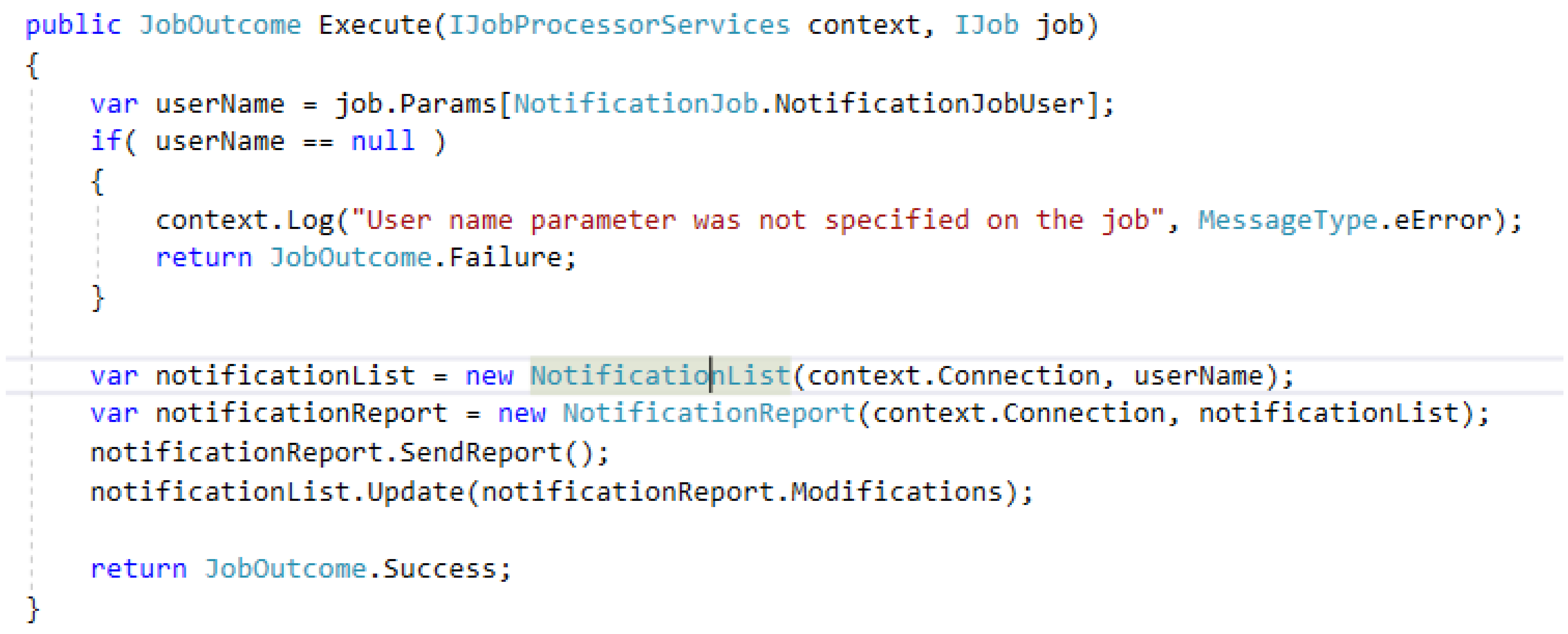


```
public void Create()
{
    if( m_job != null )
        return;

    // Schedule job recuring every 24 hours at midnight.
    //
    var frequency = TimeSpan.FromDays(1);
    var timeofday = DateTime.ParseExact("00:00", "HH:mm", System.Globalization.CultureInfo.InvariantCulture);
    var param = new ACW.JobParam() { Name = NotificationJobUser, Val = m_conn.UserName };

    m_job = m_conn.WebServiceManager.JobService.AddScheduledJob
        (NotificationJobType, "Watch list notifications for " + m_conn.UserName, new [] {param},
            50, timeofday, (int)frequency.TotalMinutes);
}
```

Executing the notification job



```
public JobOutcome Execute(IJobProcessorServices context, IJob job)
{
    var userName = job.Params[NotificationJob.NotificationJobUser];
    if( userName == null )
    {
        context.Log("User name parameter was not specified on the job", MessageType.eError);
        return JobOutcome.Failure;
    }

    var notificationList = new NotificationList(context.Connection, userName);
    var notificationReport = new NotificationReport(context.Connection, notificationList);
    notificationReport.SendReport();
    notificationList.Update(notificationReport.Modifications);

    return JobOutcome.Success;
}
```

Conclusion

Call to action

- Project Sync was built on top of these API foundations
- Other future features are also being built on this functionality
- Vault has no secret server APIs: what we can do, you can do.
- Amaze us with what you can do!

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