

TeamWorks 18.1.1

Planning Your Deployment—Best Practices

March 2019

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About This Guide

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This guide documents best practices for planning and deploying TeamWorks within a production environment. It is a companion piece to the [TeamWorks Planning Worksheets](#).

Audience

This guide is intended for TeamWorks administrators and others involved with planning a TeamWorks deployment.

Feedback

We want to hear your comments and suggestions about this guide and the other documentation included with Micro Focus TeamWorks. Please use the User Comments feature at the bottom of each page of the online documentation.

Documentation Updates

For the most recent version of this guide, visit the [TeamWorks Documentation website \(http://www.novell.com/documentation/teamworks-18/tw-plan-deploy/data/bookinfo.html\)](http://www.novell.com/documentation/teamworks-18/tw-plan-deploy/data/bookinfo.html).

Additional Documentation

The [TeamWorks documentation on the web \(http://www.novell.com/documentation/teamworks-18/tw-plan-deploy/data/bookinfo.html\)](http://www.novell.com/documentation/teamworks-18/tw-plan-deploy/data/bookinfo.html) is constantly being updated. Therefore, you should always check the latest documentation when looking for detailed information on TeamWorks.

1 Start with the Planning Worksheets

Ensuring a successful TeamWorks deployment requires up-front planning.

- 1 We recommend that you download and use the [TeamWorks Planning Worksheets spreadsheet](#) that we have posted on the TeamWorks online documentation site.
- 2 If your organization is large, consider contacting a Micro Focus Partner [to help with TeamWorks planning and deployment](#). See the [Micro Focus Partner Locator](#).

For more information about the worksheets, see the following sections:

- ♦ “About the Worksheets” on page 7
- ♦ “Worksheet Cell Key” on page 7
- ♦ “Some Worksheets Require Copying and/or Duplication” on page 8

About the Worksheets

- ♦ **Planning Order Vs. Deployment Order:** Make sure that you follow both the planning instructions and the deployment instructions in order.

The logical planning order presented in this guide is different from the correct deployment order as presented in the [installation guide](#).

- ♦ **Microsoft Excel 2013:** The planning worksheets and accompanying instructions were developed using Microsoft Excel 2013 running on Windows 7.
- ♦ **Worksheet Use:** You can use the worksheets separately or with this guide.

The recommended best practice is to follow the instructions in this guide, recording your plans in the worksheets, and referring to the [Administration UI Reference](#) for guidance and help.

You can print the worksheets and use them as a hard copy document, or if you have Excel 2013, you can take advantage of the calculation checks they contain.

Until you enter data for your deployment, the worksheet displays only base sizing numbers.

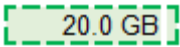
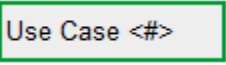


Make sure to check that the generated numbers seem logical and accurate, especially if you need to copy sections or modify the worksheets in some way.

Worksheet Cell Key

Cell borders and shadings indicate cell purposes:

Table 1-1 Worksheet Key

Cell	Purpose
<i>Total Disk Space for Attachments</i>	♦ Field name

Cell	Purpose
	<ul style="list-style-type: none"> Data input used for calculations. <p>Pre-entered data is a recommended default. For example, 20 GB is the recommended database storage allocation for room names and descriptions, topics, and comments.</p>
	<ul style="list-style-type: none"> Planning input not used in calculations.
	<ul style="list-style-type: none"> Set sizes or names that you should not change. Some used in calculations. <p>For example, the system disk size is set at 20 GB and is not configurable.</p>
	<ul style="list-style-type: none"> Calculated field. <p>Do not modify these.</p>

Some Worksheets Require Copying and/or Duplication

Because each TeamWorks deployment is unique, the instructions in this guide tell you to copy rows and worksheet sections to match your planning needs.

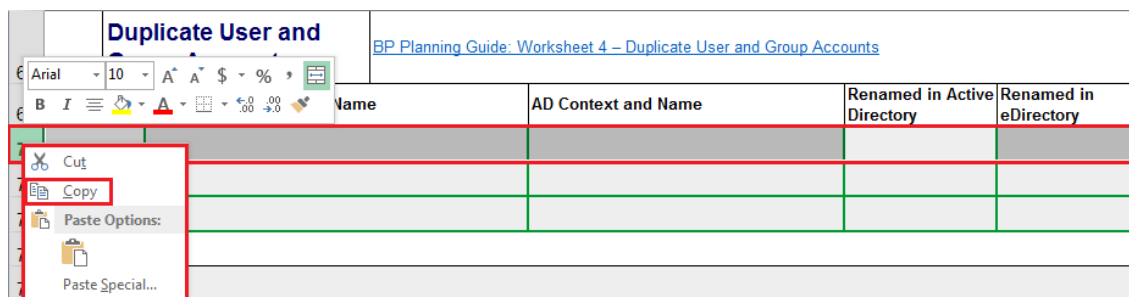
For example, within the “Use Case Scenarios” sheet the “Use Case” section is for one TeamWorks use case. You should copy the entire section as many times as needed to describe all of the use cases within your organization.

- ♦ [“Adding Rows in Worksheet Sections” on page 8](#)
- ♦ [“Making a Copy of a Worksheet Section” on page 9](#)

Adding Rows in Worksheet Sections

To add additional rows, do the following:

- 1 Open the [TeamWorks Planning Worksheets](#) spreadsheet and click to the applicable tab at the bottom.
- 2 Make sure that **View > Headings** is selected.
- 3 Right-click the row number indicator of the row or rows you want to copy and select **Copy**.



- 4 Right-click the selection and select **Insert Copied Cells**.

A new row is inserted above the row you selected.

Duplicate User and Group Accounts		BP Planning Guide: Worksheet 4 – Duplicate User and Group Accounts		
68	eDirectory Context and Name	AD Context and Name	Renamed in Active Directory	Renamed in eDirectory
69				
70				
71				
72				
73				

- 5 Repeat the process until you have as many rows as needed.
- 6 Save your worksheet.

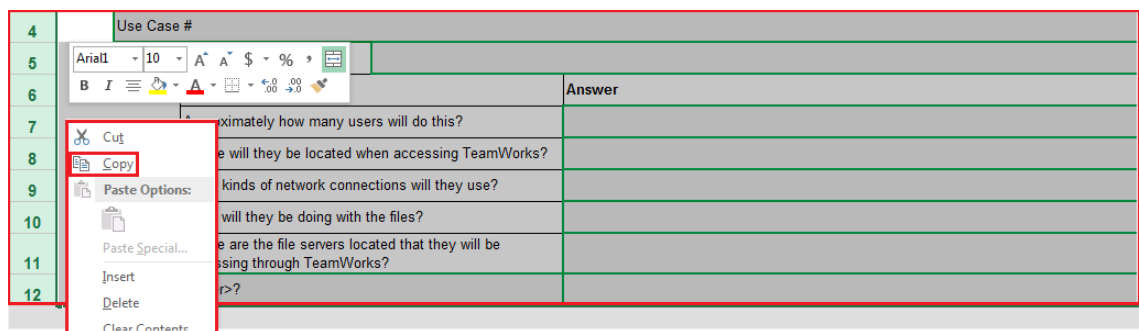
Making a Copy of a Worksheet Section

IMPORTANT: Although it is possible to copy sections using various methods, this is the simplest way that we've found.

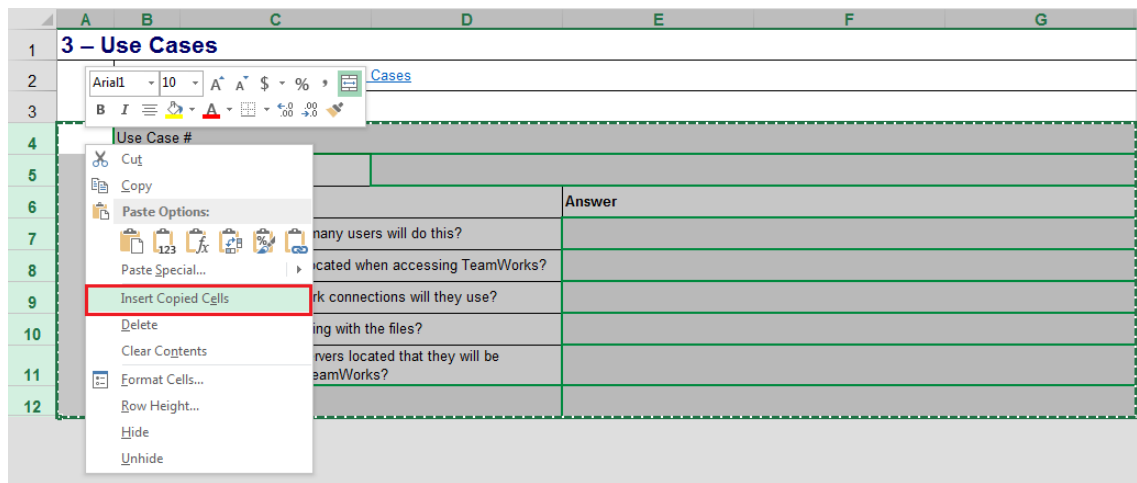
Make sure you always do the following:

- ♦ Right-click the *row-number indicators* in the following procedure, *not individual cells*.
- ♦ Copy all of the rows in a section. Otherwise, formulas used for estimating disk space and so on might become invalid.

- 1 Open the [TeamWorks Planning Worksheets](#) spreadsheet and click the applicable tab at the bottom.
- 2 Make sure that **View > Headings** is selected.
- 3 Do the following:
 - 3a Click the row-number indicator for the first row of the section.
 - 3b Press and hold the Shift key.
 - 3c Click the row-number indicator of the blank row following the last row.
 - 3d Right-click any row-number indicator within the selection.
 - 3e Select **Copy**.



- 4 Right-click any row-number indicator and select **Insert Copied Cells**.



The appropriate number of rows is inserted above what you had previously selected.

4	Use Case #		
5	Description:		
6	Question		Answer
7	Approximately how many users will do this?		
8	Where will they be located when accessing TeamWorks?		
9	What kinds of network connections will they use?		
10	What will they be doing with the files?		
11	Where are the file servers located that they will be accessing through TeamWorks?		
12	<other>?		
13	Use Case #		
14	Description:		
15	Question		Answer
16	Approximately how many users will do this?		
17	Where will they be located when accessing TeamWorks?		
18	What kinds of network connections will they use?		
19	What will they be doing with the files?		
20	Where are the file servers located that they will be accessing through TeamWorks?		
21	<other>?		

5 Save your worksheet.

2 Involving Your Stakeholders

TeamWorks deployment success depends on stakeholder buy-in and input.

Table 2-1 Worksheet 1: Stakeholders

Heading, Label, or Topic:	Information and Instructions:
List of Stakeholders	<ol style="list-style-type: none">1. Identify the stakeholders within your organization and record their information on Worksheet 1. When possible, include representatives from the following stakeholder groups:<ul style="list-style-type: none">◆ Management◆ User community◆ Server administration◆ Database administration◆ Network administration◆ LDAP Directory service administration◆ Security administration◆ Other

3 Assessing Your Organization's Needs

Complete the following worksheets:

- ♦ [Table 3-1, "Worksheet 2—Organizational Needs," on page 13](#)
- ♦ [Table 3-2, "Worksheet 3—Use Case Scenarios," on page 14](#)

Table 3-1 Worksheet 2—Organizational Needs

Heading, Label, or Topic:	Information and Instructions:
Current Team Collaboration Activities	<ol style="list-style-type: none">1. Summarize the current team collaboration activities in your organization.2. Identify by name any technologies being used during these activities.
Key Business Drivers	<ol style="list-style-type: none">1. Describe the key business drivers behind your organization's decision to deploy TeamWorks.
Security Policies	<ol style="list-style-type: none">1. Identify all security policies regarding team collaboration.
Compliance and Regulatory Standards	<ol style="list-style-type: none">1. Identify all governmental or other standards that apply to team collaboration.

Table 3-2 Worksheet 3—Use Case Scenarios

Section:	Do the following:
Use Case #	<ol style="list-style-type: none"> 1. Brainstorm to identify the unique collaboration scenarios (use cases) within your organization. 2. Copy the “Use Case #” section, including the empty row below it, as many times as needed to cover all the use cases identified. For help, see “Making a Copy of a Worksheet Section” on page 9. 3. Modify each “Use Case #” heading with a brief identifier, such as “HR Questions,” “Facilities Issues,” “Help Desk,” “Product Development,” and so on. 4. Create a summary description, such as the following: “Product development teams need a forum for sharing ideas, questions, and answers as they plan and execute product development plans.” 5. Brainstorm to fill in as many of the Answer cells as you can at this point in the planning process. Don’t spend too much effort at this point, You can revisit this and other worksheets as the scope of your deployment becomes clearer. For example: <ul style="list-style-type: none"> ◆ Approximately how many users will do this? <ul style="list-style-type: none"> - 100 employees in 5 teams ◆ Where will they be located when accessing TeamWorks? <ul style="list-style-type: none"> - 96 Developers, QA specialists, information specialists, managers, project managers, support technicians, and marketing managers, onsite at their workstations - 4 Product managers, generally off-site using iOS mobile devices. ◆ What kinds of network connections will they use? <ul style="list-style-type: none"> - Developers, etc. – GbEthernet - Product Managers - 3G or better mobile service ◆ What will they be doing? <ul style="list-style-type: none"> - All – Proposing topics for conversation, asking and answering questions, commenting on conversation threads, sharing files (mostly MS Office files, but also graphics and some videos)

4 Planning Users, Groups, and LDAP Synchronization

Most TeamWorks deployments use one or more existing LDAP sources, such as GroupWise, eDirectory, and Active Directory to control user access to the system.

The following sections help you ensure that TeamWorks includes the users and groups that will use its services.

- ◆ “LDAP Planning Tips and Considerations” on page 15
- ◆ Table 4-1, “Worksheet 4—GroupWise LDAP Server,” on page 15
- ◆ Table 4-2, “Worksheet 4—eDirectory LDAP Server,” on page 16
- ◆ Table 4-3, “Worksheet 4—Active Directory LDAP Server,” on page 17
- ◆ Table 4-4, “Worksheet 4—Duplicate User and Group Accounts,” on page 19
- ◆ Table 4-5, “Worksheet 4—User Names with Invalid Characters,” on page 19
- ◆ Table 4-6, “Worksheet 4—Non-LDAP Users,” on page 20
- ◆ Table 4-7, “Worksheet 4—Non-LDAP Groups,” on page 20
- ◆ Table 4-8, “Worksheet 5—LDAP Synchronization,” on page 20

LDAP Planning Tips and Considerations

- ◆ **LDAP and TeamWorks:** As you plan and deploy LDAP and TeamWorks, be aware of the following:
 - ◆ **Synchronization Is One-way:** LDAP synchronization is only from the LDAP directory to your TeamWorks site. If you change user information on the TeamWorks site, the changes are not synchronized back to your LDAP directory.
 - ◆ **Multi-Value Attributes Not Supported:** If your LDAP directory contains multi-value attributes, TeamWorks recognizes only the first attribute.
For example, if your LDAP directory contains multiple email addresses for a given user, only the first email address is synchronized to TeamWorks.
 - ◆ **LDAP Must Be Online:** LDAP-imported users always authenticate to TeamWorks via the LDAP source. If the LDAP source is unavailable for any reason, the LDAP-imported users cannot log in to TeamWorks.
 - ◆ **Multiple Connections Are Supported, but** you should never configure multiple LDAP connections to point to the same location on the same LDAP directory. If you need a failover solution, you should use a load balancer.

Table 4-1 Worksheet 4—GroupWise LDAP Server

Heading, Label, or Topic:	Information and Instructions:
Tree Name:	1. Record the name of the tree in which the GroupWise server is located.

Heading, Label, or Topic:	Information and Instructions:
Server Information tab	<ol style="list-style-type: none"> Using the information in “Server Information tab” in the <i>TeamWorks 18.1.1: Administrative UI Reference</i>, record information for the following: <ul style="list-style-type: none"> LDAP server URL: User DN (Admin App [LDAP proxy user]): Password (for Admin App): Directory Type: Guid attribute: TeamWorks account name attribute: LDAP attribute mappings:
Users tab:	<ol style="list-style-type: none"> Make as many copies of the Users tab section as needed to identify all of the post offices that contain users. (Nested containers are covered by subtree searching.) Using the information in “LDAP Search dialog (User Version)” in the <i>TeamWorks 18.1.1: Administrative UI Reference</i>, record the following information for each OU that contains user objects within its substructure. <ul style="list-style-type: none"> Base DN Filter (auto-generated should work in most cases) Search subtree Number of Users <p>NOTE: A dark-gray background with white text indicates a formulaic field.</p> <p>Type the number of users if you want the worksheet to use it in estimating hardware resource needs.</p>
Groups tab:	<p>For help, see “Groups tab” in the <i>TeamWorks 18.1.1: Administrative UI Reference</i>.</p> <ol style="list-style-type: none"> Make as many copies of the Groups tab section as needed to identify all of the post offices that contain groups. Using the information in “LDAP Search Dialog (Group Version)” in the <i>TeamWorks 18.1.1: Administrative UI Reference</i>, record the following information for each OU that contains group objects within its substructure. <ul style="list-style-type: none"> Base DN Filter (auto-generated should work in most cases) Search subtree

Table 4-2 Worksheet 4—eDirectory LDAP Server

Heading, Label, or Topic:	Information and Instructions:
Tree Name:	<ol style="list-style-type: none"> Record the name of the tree in which the eDirectory server is located.
Configuration Details:	<ol style="list-style-type: none"> Note important details about how the directory is configured, such as whether it has replicas, whether it is split over multiple sites, and so on.

Heading, Label, or Topic:	Information and Instructions:
Server Information tab	<ol style="list-style-type: none"> Using the information in “Server Information tab” in the <i>TeamWorks 18.1.1: Administrative UI Reference</i>, record information for the following: <ul style="list-style-type: none"> LDAP server URL: User DN (LDAP proxy user): Password (for LDAP proxy user): Directory Type: Guid attribute: TeamWorks account name attribute: LDAP attribute mappings:
Users tab:	<ol style="list-style-type: none"> Make as many copies of the Users tab section as needed to identify all of the non-nested organizational units (OUs) in your directory that contain users. (Nested OUs are covered by subtree searching.) Using the information in “LDAP Search dialog (User Version)” in the <i>TeamWorks 18.1.1: Administrative UI Reference</i>, record the following information for each OU that contains user objects within its substructure. <ul style="list-style-type: none"> Base DN Filter (auto-generated should work in most cases) Search subtree Number of Users <p>NOTE: A dark-gray background with white text indicates a formulaic field.</p> <p>Type the number of users if you want the worksheet to use it in estimating hardware resource needs.</p>
Groups tab:	<p>For help, see “Groups tab” in the <i>TeamWorks 18.1.1: Administrative UI Reference</i>.</p> <ol style="list-style-type: none"> If your LDAP structure contains group objects in non-nested organizational units (OU), make as many copies of the Groups tab section as needed to identify them all. Using the information in “LDAP Search Dialog (Group Version)” in the <i>TeamWorks 18.1.1: Administrative UI Reference</i>, record the following information for each OU that contains group objects within its substructure. <ul style="list-style-type: none"> Base DN Filter (auto-generated should work in most cases) Search subtree

Table 4-3 Worksheet 4—Active Directory LDAP Server

Heading, Label, or Topic:	Information and Instructions:
Forest Name:	<ol style="list-style-type: none"> Record the name of the forest in which the Active Directory server is located.
Configuration Details:	<ol style="list-style-type: none"> Note any important details about how the directory is configured.
Server Information	<ol style="list-style-type: none"> Identify and record the following information.

Heading, Label, or Topic:	Information and Instructions:
Server Information tab:	<ol style="list-style-type: none"> Using the information in “Server Information tab” in the TeamWorks 18.1.1: Administrative UI Reference, record information for the following: <ul style="list-style-type: none"> LDAP server URL: User DN (LDAP proxy user): Password (for LDAP proxy user): Directory Type: Guid attribute: TeamWorks account name attribute: LDAP attribute mappings:
Users tab:	<p>For help, see “Users tab” in the TeamWorks 18.1.1: Administrative UI Reference.</p> <ol style="list-style-type: none"> If your LDAP structure contains user objects in non-nested organizational units (OU), make as many copies of the Users tab section as needed to identify them all. Using the information in “LDAP Search dialog (User Version)” in the TeamWorks 18.1.1: Administrative UI Reference, record the following information for each OU that contains user objects within its substructure. <ul style="list-style-type: none"> Base DN Filter (auto-generated should work in most cases) Search subtree Number of Users <p>NOTE: A dark-gray background with white text indicates a formulaic field.</p> <p>Type the number of users if you want the worksheet to use it in estimating hardware resource needs.</p>
Groups tab:	<p>For help, see “Groups tab” in the TeamWorks 18.1.1: Administrative UI Reference.</p> <ol style="list-style-type: none"> If your LDAP structure contains group objects in non-nested organizational units (OU), make as many copies of the Groups tab section as needed to identify them all. Using the information in “LDAP Search Dialog (Group Version)” in the TeamWorks 18.1.1: Administrative UI Reference, record the following information for each OU that contains group objects within its substructure. <ul style="list-style-type: none"> Base DN Filter (auto-generated should work in most cases) Search subtree

Table 4-4 Worksheet 4—Duplicate User and Group Accounts

Heading, Label, or Topic:	Information and Instructions:
Duplicate User or Group Accounts	<p>TeamWorks doesn't accommodate duplicate user or group account names. Each LDAP-imported and manually created account must have a unique name.</p> <p>You must eliminate all duplications before importing or adding users or groups.</p> <p>For example, let's say that <code>joe_user</code> exists in both Active Directory and GroupWise, and Joe also needs a manually created TeamWorks account. You might change the Active Directory name to <code>j_user</code> and specify <code>JoeU</code> for the manual TeamWorks account.</p> <p>WARNING: Attempts to import duplicate accounts always fail, and in some cases they cause access problems for previously created accounts.</p> <p>Do the following:</p> <ol style="list-style-type: none">1. Identify any users and/or groups that have duplicate names in multiple identity stores.2. Copy as many rows as needed. For help, see "Adding Rows in Worksheet Sections" on page 8.3. Identify which identity store to change the name in and record the change in the applicable table cell.

Table 4-5 Worksheet 4—User Names with Invalid Characters

Heading, Label, or Topic:	Information and Instructions:
User Names with Invalid Characters	<p>For LDAP user names to be usable in TeamWorks, they must contain only alpha-numeric characters:</p> <ul style="list-style-type: none">◆ Upper- and lower-case letters◆ Numerals 0 - 9 <p>If they contain ASCII or special characters, such as <code>/ \ * ? " < > : </code>, then although they will synchronize as TeamWorks user names, <i>the associated users won't be able to log in</i>.</p> <p>TeamWorks uses synchronized user names to set paths to each user workspace in the file system. However, Linux and Windows file systems don't support special characters, rendering TeamWorks's path statements unresolvable.</p> <p>Do the following:</p> <ol style="list-style-type: none">1. Identify any user names that contain special characters.2. Record a revised name and context.3. Identify other services affected by the change.4. Notify users of pending name changes.5. Change the names in the directory service.6. Resolve any issues with other services.

Table 4-6 Worksheet 4—Non-LDAP Users

Heading, Label, or Topic:	Information and Instructions:
Non-LDAP Users	<ol style="list-style-type: none"> 1. Identify and record the non-LDAP users that you will need to create manually. <p>For example, plan to include industry partners or others who are outside of your organization.</p> <p>IMPORTANT: When planning and creating non-LDAP, manual accounts, make sure you don't duplicate an LDAP name. See the information and instructions for Duplicate User and Group Accounts.</p>

Table 4-7 Worksheet 4—Non-LDAP Groups

Heading, Label, or Topic:	Information and Instructions:
Non-LDAP Groups	<ol style="list-style-type: none"> 1. Identify and record the non-LDAP groups that you will need to create manually. 2. You can create two types of non-LDAP groups: <ul style="list-style-type: none"> ♦ Static groups consist of users and groups and you specifically assign. Group membership only changes as you add or remove users or groups. ♦ Dynamic groups are populated by LDAP queries that you specify. As LDAP changes, group membership changes as well. <p>IMPORTANT: When planning and creating non-LDAP, manual accounts, make sure you don't duplicate an LDAP name. See the information and instructions for Duplicate User and Group Accounts.</p> 3. For more information, see “Static Membership for Group dialog” and “Edit Dynamic Membership dialog” in the <i>TeamWorks 18.1.1: Administrative UI Reference</i>.

Table 4-8 Worksheet 5—LDAP Synchronization

Heading, Label, or Topic:	Information and Instructions:
Nested Groups:	<ol style="list-style-type: none"> 1. Determine whether your LDAP identity stores include nested groups (groups inside other groups), then mark the appropriate option on the planning sheet. 2. If you have groups that are contained in other groups, you must plan to synchronize LDAP at least two or more times until all of the nested groups and their users are synchronized. 3. After this initial synchronization, standard settings will keep nested groups synchronized.
Frequency of LDAP Changes:	<ol style="list-style-type: none"> 1. Consult with the LDAP administrator to determine how often LDAP information changes so that it needs to be synchronized with TeamWorks. This will inform the schedule plans you make in the next row.

Heading, Label, or Topic:**Information and Instructions:**

Synchronization Schedule tab

1. Your LDAP integration plan must include LDAP synchronization.
 2. The synchronization schedule you set here applies to all of your LDAP servers. For most organizations, daily synchronizations are sufficient, for others they aren't.
 3. TeamWorks must synchronize with its LDAP directory stores to know about changes to
 - ◆ User and group lists
 - ◆ Password changes
 - ◆ File and folder access rights
 4. For more information, see "[Synchronization Schedule tab](#)" in the [TeamWorks 18.1.1: Administrative UI Reference](#)
-

5 Planning for User-Generated Storage

Complete the instructions in the following sections to plan for the disk space that TeamWorks will require.

- ♦ [Table 5-1, “Worksheet 6—User Generated Storage and Limitations,” on page 23](#)

User-Generated Data

Table 5-1 Worksheet 6—User Generated Storage and Limitations

Heading, Label, or Topic:	Information and Instructions:
Estimate: Disk Space Needed for Topics and Comments	<p>Room names and descriptions, topics, and comments are all stored in the SQL database. Depending on the database, a liberal estimate of the disk space consumed by these would be double the size of the text strings themselves.</p> <p>For example, the comment <code>This is a very good idea. We should pursue it.</code> is 46 characters long and would, therefore, require 46 Bytes.</p> <p>If we double the Byte count to plan for database overhead, it would still only consume 92 Bytes, meaning that over 11,000 such comments would fit in one MB of disk space.</p> <p>For this reason, the development team believes that allocating 20 GB of database disk space to TeamWorks should be sufficient in the vast majority of cases.</p> <p>On the PostgreSQL appliance, the database is located on the <code>/vastorage</code> disk.</p>
Estimate: Disk Space Needed for Attachments	<p>Each attachment is assumed to consume its size in disk space.</p> <p>For this option, do the following:</p> <ol style="list-style-type: none">1. Double-click the GB cell next to the Total Disk Space for Attachments per User field and estimate how much disk space the average user will consume for attachments.2. The number of Users is automatically derived from the numbers that you entered in Worksheet 4 - Users and Groups..3. The spreadsheet calculates the Total Disk Space for Attachments by multiplying the estimated attachment size by the number of users.

**Heading, Label, or
Topic:**

Information and Instructions:

File Upload Size Limits

Although you can't directly limit how many attachments users might create, you can limit how large those attachments can be.

By default, there is no limit on attachment file size, but you can adjust this as follows:

1. Use the **Default File Upload Size Limit** field to set a default file upload size.
2. Set limits for specific users and groups.

NOTE: Although groups are not yet supported for room membership, they are fully functional where included in administrative settings.

1. After you have planned for user-generated storage, continue with "[Planning TeamWorks Email Integration.](#)"
-

6 Planning TeamWorks Email Integration

GroupWise, TeamWorks, and Secure SMTP

By default, TeamWorks is configured to use its built-in Postfix mail server for sending email messages. The Postfix mail server in TeamWorks communicates using only non-secured Simple Mail Transfer Protocol (SMTP) packets. Secured SMTP (SMTPS) is not available.

In contrast, GroupWise 2018 only accepts SMTPS communications by default.

If you determine that there is minimal risk because, for example, GroupWise and TeamWorks communicate through the same switch, then the GroupWise server's settings can be changed to allow SMTP communications. However, by default TeamWorks and GroupWise cannot exchange email messages.

To illustrate, let's say Tristan's organization uses GroupWise 2018 and his email address is `tristan@tw-doc-lab.com`. Furthermore, let's say that he has requested to receive email notifications of TeamWorks events.

When a requested event occurs, TeamWorks sends an email message through its Postfix server to `tristan@tw-doc-lab.com`. Because the email is not secure, the GroupWise server rejects it.

Tristan's systems administrator has two options for dealing with this issue:

- ♦ Modify the SMTP settings on the GroupWise server to allow non-SSL communications.

In the GroupWise Administration Console, click **Internet Agents > GWIA > Agent Settings** and change **SMTP** to *Enabled*. (See the GroupWise documentation for more information.)

Or

- ♦ Configure the TeamWorks Outbound Email service to use an email server with SMTPS capabilities. In this case, the alternate email server could be the same one where Tristan's account resides.

Remember to set up SSL communications between TeamWorks and the mail server, including importing a server certificate into the TeamWorks certificate store.

Table 6-1 Worksheet 7—Email Integration

Heading, Label, or Topic:	Information and Instructions:
Outbound Email dialog	<ol style="list-style-type: none">1. Referring to the information in “Configuring an Email Service for TeamWorks Notifications” in the <i>TeamWorks 18.1.1: Administrative UI Reference</i>, record your settings for the following fields on Worksheet 13 > Email Service Integration:<ul style="list-style-type: none">◆ Use Local Postfix Mail◆ Protocol:◆ Host:◆ Port:◆ Time Zone:◆ User Name:◆ Password:◆ Authentication required:◆ Allow sending email to all users:◆ Force HTTPS Links:◆ Enable STARTTLS:◆ From e-mail address override:◆ Use from e-mail address override for all outbound e-mail:◆ Connection Timeout:

7 Planning Administrative Access

Table 7-1 Worksheet 8 - Administrative Access

Heading, Label, or Topic:	Information and Instructions:
Full Administrators	<ol style="list-style-type: none">1. Identify those who will have the passwords required for full administrative access to the TeamWorks system and mark the ports (8443 and 9443) that they will have access to.
Direct Administrators (Port 8443)	<ol style="list-style-type: none">1. Record the information for other users or groups that will be assigned as Direct Port 8443 administrators, and if desired, indicate their intended or assigned purpose or scope. Direct administrators can manage:<ul style="list-style-type: none">◆ Users◆ Groups2. When you have planned for administrative access, continue with “Planning Network Support.”

8

Planning Network Support

- ◆ Table 8-1, “Worksheet 9 - IP Address Infrastructure Information,” on page 29
- ◆ Table 8-2, “Worksheet 9 - Appliance-Specific IP Address Information,” on page 30
- ◆ “Ports and Firewalls” on page 30
- ◆ “Planning the Time Zone of the TeamWorks Appliance to Match the Time Zone of any File Servers” on page 30

Table 8-1 Worksheet 9 - IP Address Infrastructure Information

Heading, Label, or Topic:	Information and Instructions:
Primary Network	<ol style="list-style-type: none">1. On Worksheet 9 - Network Support, record the IP address information for the network that your TeamWorks deployment will communicate on, including:<ul style="list-style-type: none">◆ Subnet Address:◆ Subnet Mask:◆ Name Servers:◆ Search Domain: (default is domain specified for appliance DNS names) IMPORTANT: Include each domain where TeamWorks and Search appliances are located (up to 3). This is required so that short hostnames (hostname -s) are resolvable within Rabbit MQ.◆ Gateway:
Secondary Network (optional for TeamWorks appliance administration)	<ol style="list-style-type: none">1. (Optional) If you plan to administer TeamWorks through a second network card, record the same IP address information for the secondary network that you did for the first.2. If you will use only one network, leave this section blank.
Load Balancing	<ul style="list-style-type: none">◆ Micro Focus recommends using a load balancer.◆ Hardware or software solutions can be used.◆ For more information, see “Reverse Proxy Configuration Settings” in the TeamWorks 18.1.1: Administrative UI Reference. <ol style="list-style-type: none">1. Mark or note the load balancer solution you plan to use.2. Note any information about the solution you plan to deploy or integrate with.
Port 9443 Admin Console Access Restrictions	<ol style="list-style-type: none">1. If you want to limit appliance administration, specify the IP addresses of the networks from which you want to allow administrative access on Port 9443.

Table 8-2 Worksheet 9 - Appliance-Specific IP Address Information

Heading, Label, or Topic:	Information and Instructions:
Preparing the worksheet	<ol style="list-style-type: none">1. Copy the pertinent appliance sections, until you have one for each TeamWorks and Search appliance you will deploy. Micro Focus recommends the following:<ul style="list-style-type: none">◆ At least 3 TeamWorks appliances, two fronted by a load balancer and one dedicated to indexing.◆ Three Search appliances, two running the Messaging service.◆ An in-house SQL server
NIC Configuration Settings	<ol style="list-style-type: none">1. Change each angle-bracketed name to a name that identifies each TeamWorks and Search appliance.2. For each appliance and the SQL server, record the IP address information you will specify during deployment. IMPORTANT: TeamWorks requires that static IP addresses be used throughout (as indicated on the worksheet).

Ports and Firewalls

- 1 Review the information in “Port Numbers” in the [TeamWorks 18.1.1: Administrative UI Reference](#).
- 2 On Worksheet 9 - Port and Firewall Requirements, record any concerns about the TeamWorks’s port number requirements and note plans to resolve the concerns.

Planning the Time Zone of the TeamWorks Appliance to Match the Time Zone of any File Servers

TeamWorks and its back-end file servers should be synchronized to the same time and to the same time zone.

If time zones are not synchronized in this way, users might see conflicting creation and modification times for files.

- 1 On Worksheet 9 - Time Zone Configuration, note the addresses of the NTP servers that TeamWorks appliances and back-end file servers will use.
- 2 Specify the specific Time Zone.

9 Planning Your Appliances

NOTE: If you are deploying an all-in-one appliance, skip to [Appendix A, “Considering an All-in-One Deployment,”](#) on page 41.

- ◆ “TeamWorks Appliance Roles” on page 31
- ◆ “TeamWorks Appliance Planning” on page 32
- ◆ “Search Appliance Planning” on page 33
- ◆ “SQL Database Planning” on page 34
- ◆ “/vashare Allocation and Creation” on page 35

TeamWorks Appliance Roles

The appliances in a multiple-appliance TeamWorks deployment perform three distinct roles that are essential to delivering TeamWorks services.

Table 9-1 Appliance Role Summary

	TeamWorks	Search	PostgreSQL (if needed)
Role	◆ Team collaboration	◆ Content indexing for searching purposes	◆ Database storage of room, topic, and comment data, system configuration, and user/group identities
Number Required	◆ At least one and generally three as a best practice for fault tolerance. After that, as many as the service load demands.	◆ Three This ensures search and messaging service fault tolerance. Having more than three is not recommended or needed.	◆ The best practice is to use an existing SQL database server. The PostgreSQL appliance should only be used if an existing database server is not available.
Dependencies	◆ At least one Search appliance ◆ Access to a PostgreSQL or Microsoft SQL database	◆ None	◆ None

	TeamWorks	Search	PostgreSQL (if needed)
Functions	<ul style="list-style-type: none"> ♦ Run a number of web-based services that are responsible for TeamWorks client interactions with the rest of the system. 	<ul style="list-style-type: none"> ♦ Accept information to be indexed. ♦ Respond to user-initiated search requests from TeamWorks Appliances. 	Store and provide access to the following: <ul style="list-style-type: none"> ♦ Configuration settings for all of the TeamWorks appliances ♦ Information on the users and conversations within the system
Best Practices	<p>Required: Configure /vashare to point to a remote NFS disk that all TeamWorks and Search appliances share in common.</p> <p>Strongly recommended: Deploy at least three TeamWorks appliances.</p>	<p>Strongly recommended: Deploy three Search appliances to provide fault tolerance and eliminate a single point of failure.</p>	<p>Recommended: Consult with a qualified database administrator and use a high-availability in-house PostgreSQL or Microsoft SQL installation whenever possible.</p>

TeamWorks Appliance Planning

As noted elsewhere, you can adjust the numbers shown with green borders. Data numbers in white cells are fixed and should not be changed. Cells with black dashes are calculated based on information you entered previously and you should not modify them directly.

Table 9-2 Using Worksheet 10 - TeamWorks Appliances

Item	Recommendations and Guidelines	Worksheet Calculations and Examples
♦ / (System Disk)	♦ 20 GB fixed	♦ This is set at 20 GB. You cannot alter the size.
♦ /vastorage	A TeamWorks appliance in a multiple-appliance deployment stores the following in /vastorage: <ul style="list-style-type: none"> ♦ Configuration files that are used for appliance upgrades. ♦ Ganglia files that store monitoring information. <p>In most cases, 10 GB should be more than sufficient.</p>	♦ The worksheet assumes that 10 GB is sufficient. <p>You can input a different number if desired.</p>

Item	Recommendations and Guidelines	Worksheet Calculations and Examples
♦ /var	<p>TeamWorks appliances store the following in /var:</p> <ul style="list-style-type: none"> ♦ System event logs <ul style="list-style-type: none"> ♦ The maximum size is 100 MB per log file. ♦ The system automatically deletes log files older than 30 days. ♦ Therefore, log files are basically capped at 3 GB but the worksheet allows for 4 GB as a buffer. ♦ Memory core dumps <p>Micro Focus recommends reserving space for three core dumps, so total RAM times 3</p>	<p>The worksheet calculates this as follows:</p> <ol style="list-style-type: none"> 1. It automatically includes 4 GB for system logs. 2. It multiplies the total RAM by 3 to accommodate core dumps and adds it to the system log amount.
♦ CPUs	♦ 4 CPUs is the standard.	<p>♦ The worksheet uses the default.</p> <p>You can input a different number if desired.</p>
♦ RAM	<p>Use the following guidelines when planning RAM for TeamWorks appliances:</p> <ul style="list-style-type: none"> ♦ No less than 8 GB should be allocated. ♦ If 8 is used as the base, then 1 GB should be added for each increment of 2,000 users over 2,000. 	<p>The worksheet calculates total RAM required as follows:</p> <ol style="list-style-type: none"> 1. It includes 8 GB as the base amount. 2. It takes the total user count, subtracts 2,000, and divides the remainder by 2,000. 3. It then adds the results from the two steps above and displays it as a whole number.

Search Appliance Planning

The amounts shown in “Worksheet 11 - Search Appliances” are explained in [Table 9-3](#). As noted elsewhere, you can adjust the numbers shown with green borders. Data numbers in white cells are fixed and should not be changed. Cells with black dashes are calculated based on information you entered previously and you should not modify them directly.

Table 9-3 *Using Worksheet 11 - Search Appliances*

Item	Recommendations and Guidelines	Planning Worksheet Example
♦ / (System Disk)	♦ 20 GB fixed	

Item	Recommendations and Guidelines	Planning Worksheet Example
♦ /vastorage	Use the following guidelines when planning /vastorage for a Search appliance. <ul style="list-style-type: none"> ♦ Allocate 10 GB as a base amount. ♦ Add the amount set for storing rooms, topics, and comments. 	The worksheet calculates this as follows: <ol style="list-style-type: none"> 1. It includes 10 GB as a base disk amount. 2. It adds the amount estimated for storing room, topic, and comment data on Worksheet 6 - User-Gen'd Storage & Limits.
♦ /var	Use the following guidelines when planning /var for a Search appliance. <ul style="list-style-type: none"> ♦ Include 4 GB for system logs. ♦ Include space for core dumps by multiplying the total RAM allocation by 3. 	The worksheet calculates this as follows: <ol style="list-style-type: none"> 1. It automatically includes 4 GB for system logs. 2. It multiplies the total RAM by 3 to accommodate core dumps.
♦ CPUs	♦ The default allocation at install time is 2 CPUs. However, large installations usually require 4 CPUs.	The planning worksheet reflects a large installation, so 4 CPUs are planned.
♦ RAM	Use the following guidelines when allocating RAM for a Search appliance. <ul style="list-style-type: none"> ♦ Plan to allocate 30% of amount calculated for /vastorage or 8 GB, whichever is greater. 	The worksheet calculates this as follows: <ol style="list-style-type: none"> 1. It multiplies the calculated amount for /vastorage by 3 to get 30% and displays either the result as a whole number or 8 GB in the RAM (GB) cell.
♦ JVM Heap Allocation	Use the following guidelines when allocating RAM for a Search appliance. <ul style="list-style-type: none"> ♦ You should adjust the JVM Heap size to be 50 - 60% of total RAM. 	The worksheet calculates this as follows: <ol style="list-style-type: none"> 1. It multiplies the RAM (GB) cell by .7 to get 70%.

SQL Database Planning

Database Planning Tips and Caveats

- TeamWorks supports the following databases:

- ♦ PostgreSQL
- ♦ Microsoft SQL 2008 R2, 2012, and 2014

If you have a PostgreSQL or Microsoft SQL installation, Micro Focus recommends that you leverage that resource and take advantage of your existing infrastructure.

- Ensure that the TeamWorks and Search appliances' shared storage (the /vashare mount point) is protected by traditional clustering to provide for high availability.
- The PostgreSQL or Microsoft SQL server and database that TeamWorks appliances access should also be protected for high availability.

Database Sizing

The amounts shown in “Worksheet 12 - SQL Database” are explained in [Table 9-4](#). As noted elsewhere, you can adjust the numbers shown with green borders. Data numbers in white cells are fixed and should not be changed. Cells with black dashes are calculated based on information you entered previously and you should not modify them directly.

Table 9-4 Using Worksheet 12 - SQL Database

Item	Recommendations and Guidelines	Planning Worksheet Example
<ul style="list-style-type: none"> ◆ / (PostgreSQL appliance) 	<ul style="list-style-type: none"> ◆ 20 GB fixed 	
<ul style="list-style-type: none"> ◆ Database /vastorage on PostgreSQL appliance 	<p>Use the following guidelines when planning for the SQL database:</p> <ul style="list-style-type: none"> ◆ Allocate 40 GB as a starting amount. ◆ Allocate 20 GB for rooms, topics, and comments. ◆ Allocate 20 KB per user. 	<p>The worksheet calculates this as follows in both the SQL Database and PostgreSQL Appliance sections:</p> <ol style="list-style-type: none"> 1. It includes 40 GB as a base database amount. 2. It adds whatever amount you have set for room, topic, and comment storage. 3. It multiplies the total number of users by 20 KB (.000020 GB).
<ul style="list-style-type: none"> ◆ /var (PostgreSQL appliance) 	<ul style="list-style-type: none"> ◆ 4 GB for log files ◆ Three times the RAM for core dumps. 	
<ul style="list-style-type: none"> ◆ CPUs 	<ul style="list-style-type: none"> ◆ The default allocation at install time is 2 CPUs. However, large installations usually require 4 CPUs. 	<p>The planning worksheet reflects a large installation, so 4 CPUs are planned.</p>
<ul style="list-style-type: none"> ◆ RAM (PostgreSQL appliance) 	<p>Use the following guidelines when planning the RAM allocation for the PostgreSQL appliance.</p> <ul style="list-style-type: none"> ◆ 8 GB or 8% of /vastorage, whichever is greater. 	<p>The worksheet calculates this as follows in the PostgreSQL Appliance section:</p> <ol style="list-style-type: none"> 1. It multiplies the /vastorage size by .08 to get 8%. 2. If the result is greater than 8, it displays the result. Otherwise, it displays 8.

/vashare Allocation and Creation

/vashare Planning Tips and Caveats

- ◆ Monitor and clean up the /vashare/cachefilestore area as needed.

Cached files are automatically deleted on an appliance restart when they exceed 10 GB in size.

- ◆ Windows NFS services are not supported.
- ◆ The NFS or CIFS server should be on or near the same subnet as the TeamWorks deployment. TeamWorks is not latency tolerant.

- ◆ When exporting the remote NFS directory, you must specify the `rw` and `no_root_squash` export options.
- ◆ To secure NFS server access, as you specify the export options for the exported directory, make sure to create a DNS entry for each TeamWorks appliance that needs access.
Otherwise, any NFS client on the network will be able to mount the exported directory.

/vashare Sizing

The allocation for /vashare is calculated in “Worksheet 14 - Storage Planning Summary” based on information you entered previously as explained in [Table 9-5](#).

Table 9-5 Using Worksheet 14 - Storage Planning Summary (/vashare)

Item	Recommendations and Guidelines	Planning Worksheet Example
◆ /vashare	You must create an external NFS or CIFS share for this. It must be large enough to accommodate some system configuration information but mostly the file attachments that users share in TeamWorks.	The worksheet calculates this as follows: <ol style="list-style-type: none"> 1. It allocates 10 GB for system configuration files. 2. It includes the attachment estimate calculated on Worksheet 6 - User Gen'd Storage & Limits.

10 Planning the Virtual Machines and VM Host Servers

- 1 Use the information in [Table 10-1](#) to identify the resources that your VM host servers must have to support your TeamWorks deployment.
- 2 After your plan is complete, ensure that it has stakeholder buy-in and adjust it if required.
- 3 After all of your plans are finalized, continue with “[Leverage a Pilot Deployment.](#)”

Table 10-1 Worksheet 13 - VM Host Servers

Heading, Label, or Topic:	Information and Instructions:
<ul style="list-style-type: none"> ◆ Platform and Version: 	<p>TeamWorks runs on VMware host platforms. For specific version and other requirements, see “Virtualization Hypervisor Platform” in the GroupWise TeamWorks 18.1.1: Installation and Deployment Guide.</p> <ol style="list-style-type: none"> 1. On Worksheet 13, record the platform and version of the VM host server you will use for TeamWorks.
<ul style="list-style-type: none"> ◆ Number of Physical Network Adapters: 	<ol style="list-style-type: none"> 1. Record the number of physical network adapters that your TeamWorks deployment requires. <p>For example, if you plan to use a secondary network for TeamWorks administration or have other requirements, note them here.</p>
<ul style="list-style-type: none"> ◆ Disk Space: 	<p>If you have filled in all of the required worksheet fields, worksheet formulas display an estimation of the disk space needed for the TeamWorks and Search appliance disks. /vastorage and SQL database server requirements are not included. The optional PostgreSQL appliance is also not included.</p> <p>CAUTION: The estimates calculated by worksheet formulas are only provided for your convenience.</p> <p>Do not use the worksheet numbers for your deployment.</p> <p>Perform separate calculations of your own, and if you want to, use the worksheet calculations as a secondary check.</p>
<ul style="list-style-type: none"> ◆ CPUs: 	<p>Worksheet formulas add the number of CPUs you have planned for each TeamWorks and Search appliance.</p> <p>This only provides a summary for your convenience.</p> <p>You and/or your VM administrator can reference this number as a starting point when assessing your plans and allocating CPU resources to the TeamWorks virtual machines.</p>
<ul style="list-style-type: none"> ◆ RAM Required: 	<p>Worksheet formulas add the total RAM allocations for all TeamWorks and Search appliances.</p> <p>As with the CPU estimates, this number only provides a summary for you to use as you plan your TeamWorks deployment on your VM host server.</p>

11

Leverage a Pilot Deployment

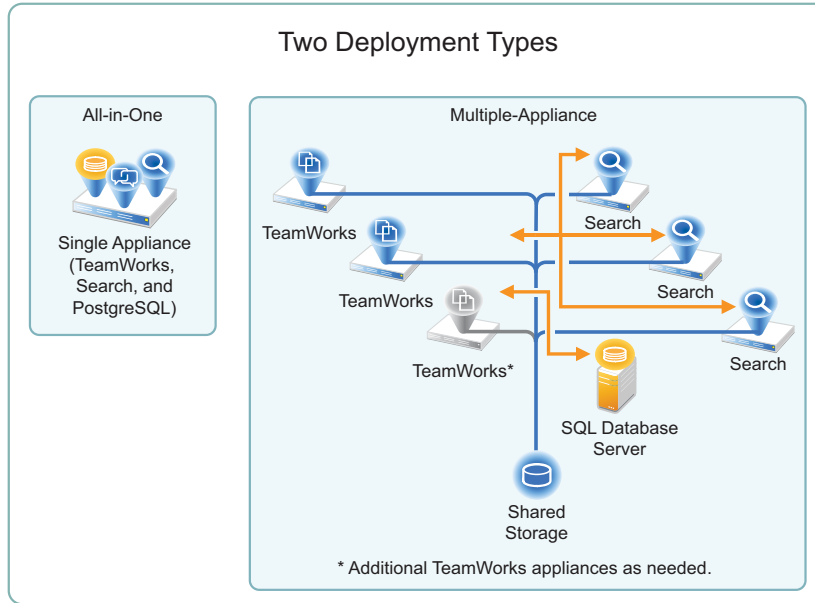
Toward the end of your planning process, use a pilot deployment to validate and improve your production deployment plans.

- 1 Create a small pilot deployment that represents the breadth of the plans you have made.
- 2 Test and monitor your pilot deployment to see whether it is meeting users' needs.
- 3 Adjust your plans as needed.
- 4 When your plan seems solid, proceed with “[Setting Up NFS Shared Storage](#)” in the *GroupWise TeamWorks 18.1.1: Installation and Deployment Guide*.

A Considering an All-in-One Deployment

A multiple-appliance deployment is the best practice recommendation for all but small organizations that don't require service fault tolerance or expansion capabilities.

Figure A-1 TeamWorks's Two Deployment Types



- ◆ [“Before You Deploy an All-in-One Appliance” on page 41](#)
- ◆ [“All-in-One Appliance Planning” on page 43](#)

Before You Deploy an All-in-One Appliance

Unless you are deploying an all-in-one appliance as a test installation, make sure you understand the following before proceeding.

The Basic Difference Is Shared Storage

Multiple-appliance deployments involve shared storage; all-in-one deployments do not.

No Shared Storage	Shared Storage
<ul style="list-style-type: none"> ◆ One TeamWorks Appliance ◆ No fault tolerance—Single Point of Failure ◆ Not expandable beyond a single TeamWorks appliance 	<ul style="list-style-type: none"> ◆ Multiple TeamWorks Appliances ◆ Fault-tolerant TeamWorks services ◆ Expandable by adding TeamWorks appliances, disk space, or RAM as needs increase

More Deployment-Type Details

As illustrated in [Figure A-1](#), TeamWorks can be deployed in two different ways.

[Table A-1](#) summarizes important comparison points.

Table A-1 Comparing Deployment Types

	All-in-One	Multiple-Appliance
Best Practice Recommendation	Recommended for: <ul style="list-style-type: none"> ◆ Proof of concept ◆ Very small organizations with no growth anticipated 	Recommended for all organizations unless a small deployment clearly meets all present and future needs.
Deployment Documentation	“Creating an All-in-One Deployment” in the GroupWise TeamWorks 18.1.1: Installation and Deployment Guide	This planning guide and the TeamWorks Installation and Upgrade Guide.
Deployment Size	One all-in-one appliance	<ul style="list-style-type: none"> ◆ At least two TeamWorks appliances for fault tolerance, three recommended as a best practice; one required. ◆ Three Search appliances with two of them running the Messaging service. ◆ Access to a PostgreSQL or Microsoft SQL database, or one PostgreSQL appliance
Off-loading Processor-Intensive Functions	n/a	We recommend dedicating one TeamWorks appliance to only content synchronization and indexing.
Expansion to Accommodate Increased TeamWorks-Service Demands	n/a	<p>In theory, you can add as many TeamWorks appliances as needed.</p> <p>In practice, as with any system, there are limitations external to TeamWorks, such as network bandwidth, hardware limitations, and other constraints that, at some point, become bottlenecks for TeamWorks scalability and performance.</p> <p>Micro Focus’ performance and scale test beds include up to 10 TeamWorks appliances.</p>
Fault Tolerance	n/a	<p>Multiple TeamWorks appliances provide continual service access</p> <p>Search appliances are independent and redundant.</p> <p>Three index servers are the recommendation for all deployments</p>
High Availability	Single point of failure	With a load balancer deployed, two or more TeamWorks Appliances can be attached to the same shared storage, which in turn can be protected by traditional clustering.

	All-in-One	Multiple-Appliance
Migration to a Multiple-appliance deployment	Not supported	Migration is supported.
User requests per second It isn't possible to define the number of users that a TeamWorks appliance can service.	In a lab setting, a single TeamWorks appliance accommodates 762 logged-in users making 42 requests per second with no performance degradation.	Load handling per TeamWorks appliance is the same as all-in-one deployments. However, adding TeamWorks appliances expands the capabilities.
SQL Database	Integrated	Separate SQL database recommended. PostgreSQL appliance available. It is designed only for dedicated TeamWorks use.

All-in-One Appliance Planning

As noted elsewhere, you can adjust the numbers shown with green borders. Data numbers in white cells are fixed and should not be changed. Cells with black dashes are calculated based on information you entered previously and you should not modify them directly.

Table A-2 Using Worksheet 10-a - All-in-One Appliance

Item	Recommendations and Guidelines	Worksheet Calculations and Examples
◆ / (System Disk)	◆ 20 GB fixed	◆ This is set at 20 GB. You cannot alter the size.
◆ /vastorage	An all-in-one appliance stores the following in /vastorage: <ul style="list-style-type: none"> ◆ Configuration files that are used for appliance upgrades. ◆ Ganglia files that store monitoring information. ◆ Attachments that users upload to share. 	The worksheet calculates this as follows: <ul style="list-style-type: none"> ◆ It automatically includes 10 GB for configuration and Ganglia files. ◆ It includes 40 GB as a base database amount. ◆ It adds the user-generated storage total on Worksheet 6 - Gen'd Storage and Limits. ◆ It multiplies the total number of users by 20 KB (.000020 GB) and adds that to the total.

Item	Recommendations and Guidelines	Worksheet Calculations and Examples
♦ /var	<p>TeamWorks appliances store the following in /var:</p> <ul style="list-style-type: none"> ♦ System event logs <ul style="list-style-type: none"> ♦ The maximum size is 100 MB per log file. ♦ The system automatically deletes log files older than 30 days. ♦ Therefore, log files are basically capped at 3 GB but the worksheet allows for 4 GB as a buffer. ♦ Memory core dumps <p>Micro Focus recommends reserving space for three core dumps, so total RAM times 3</p> 	<p>The worksheet calculates this as follows:</p> <ol style="list-style-type: none"> 1. It automatically includes 4 GB for system logs. 2. It multiplies the total RAM by 3 to accommodate core dumps and adds it to the system log amount.
♦ CPUs	♦ 4 CPUs is the standard.	<p>♦ The worksheet uses the default.</p> <p>You can input a different number if desired.</p>
♦ RAM	<p>Use the following guidelines when planning RAM for an all-in-one appliance:</p> <ul style="list-style-type: none"> ♦ No less than 16 GB should be allocated. 	<p>The worksheet calculates total RAM required as follows:</p> <ol style="list-style-type: none"> 1. It includes 16 GB as the base amount. 2. It takes the total user count, subtracts 2,000, and divides the remainder by 2,000. 3. It then adds the results from the two steps above and displays it as a whole number.