



KEYnote 40

THE WIBU - MAGAZINE

CodeMeter Protection Suite – A Tool for All Seasons

Highlights

- License Portals – Default and Custom Look
- Portable Licenses in the Cloud
- Flexible Network Licenses



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Dear Clients and Partners!



done to improve our protections and avoid vulnerabilities. Our CERT team is actively working to keep our guard up now and, in the future, while sharing their expertise with the world in the form of dedicated advisory services. Our new data center partner has gained the “Trusted Cloud” label alongside many other certifications to guarantee greater reliability for any CodeMeter License Central installation and business process integration you have entrusted us with. CmCloud offers you top performing and readily scalable license containers in the cloud.

“Coming together is a beginning. Keeping together is progress. Working together is success”. This adage attributed to Henry Ford, I believe, has lost none of its value, but indeed has only become more relevant than ever in a time of medical and political challenges for so many of us. Let us stay positive about the future and work together to make it a success.

Success is incumbent upon our ability to seize the opportunities of digitalization for the good of our users, tailor products to fit their needs, and do our utmost to make them safer and more secure. We are always working to improve and perfect our solutions with more features, greater security, and faster performance. One key aspect of this goal is AI, which has given Python an increasingly prominent role and opened new vistas for CodeMeter. Another is the work that is being

Our new head offices and the House of IT Security, both nearing completion and ready to grace Karlsruhe’s cityscape from Q1 2021 onward, represent other milestones for co-operation in an ideal work environment at Wibu-Systems and with the other enterprises and research institutions we are proud to have near us. You can follow our progress at www.wibu.com/hoits.

Let us work together for a successful 2021. I am looking forward to staying in touch with you – virtually or in person. Keep yourself, your teams and your loved ones safe and optimistic in what I hope will be a comforting and uplifting holiday season.

Kind regards,

Oliver Winzenried

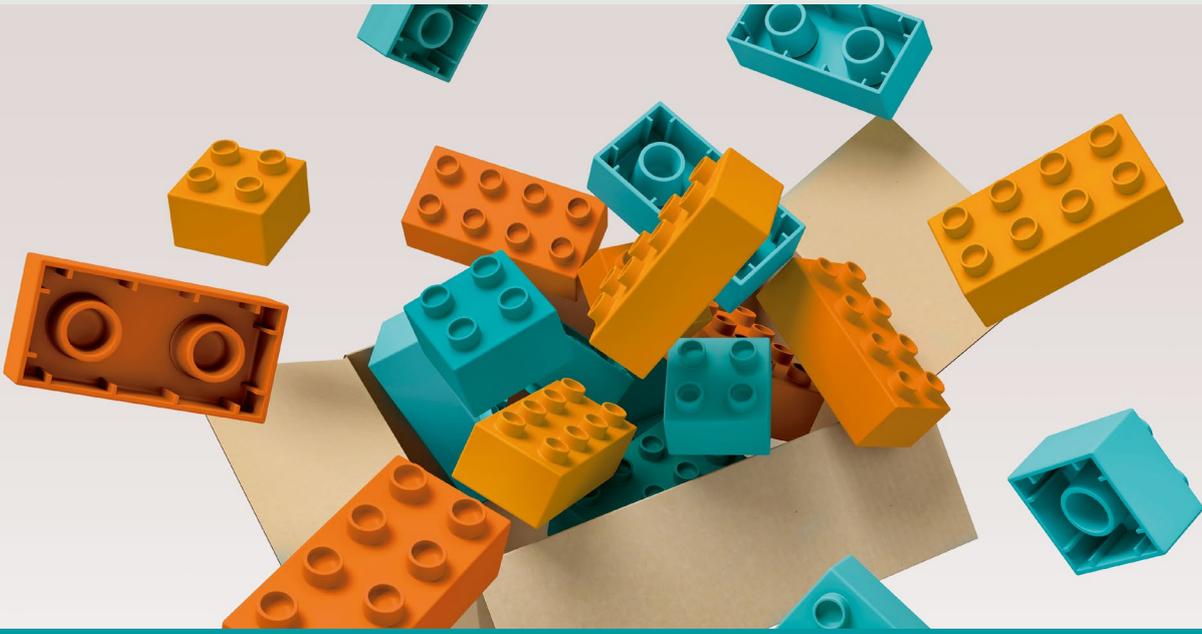
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ALERT

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License Portals – Default and Custom Look

With license portals, everyone benefits – software developers and their users. License portals enable users to manage their licenses whenever they want and wherever they have to. They can activate licenses, transfer them to other devices, or even recover lost licenses to the extent allowed by the software vendor. This means exceptional availability and real customer satisfaction, coming not at a cost, but with a gain for the developer, as license portals keep the support and maintenance costs down.

Why Modular?

People often ask: “What does the standard license portal of Wibu-Systems look like?” Sometimes, the answer is: “Let’s have a look at our WebDepot”. Other times it is: “There is no one standard. You have all the flexibility you want.” Can both be true? The answers are not as contradictory as they seem: It is very rare for software developers to start from scratch. In most cases, their software licenses have to fit in with an existing ecosystem of ERP, CRM, e-commerce, user portal systems etc. And in very few of these cases would this ecosystem be clear-cut and homogeneous.

Sales and distribution processes differ from vendor to vendor: There are still traditional face-to-face sales, but the standard is a wild combination of online sales via some e-commerce channel, brand-store sales, long daisy chains of resellers, OEM partners, VARs, online traders, and – legend has it – high-end electronics retailers like Best Buy. Some sales models focus on the end user, while others are squarely aimed at projects with commercial

clients. The education system is also a popular market. Seeing the many different needs and expectations of these many models, Wibu-Systems asked itself: “What should the standard license portal look like?”, and the answer was that a single one-size-fits-all solution would be too complex and too unwieldy for most users, other than qualified computer scientists. This is why Wibu-Systems made the decision to produce an easily customizable, flexible, and expandable toolkit to design the right portals for each target group quickly and efficiently. Ockham’s razor applies: “Entities are not to be multiplied without necessity”.

The Bare Bones

Where does WebDepot come into the picture? Wibu-Systems’ WebDepot is the most basic configuration of the license portal, which includes all the functions relevant for anonymous single users. Why can the user stay anonymous? They get an activation code, the ticket, from the software developer, which is used for authentication in WebDepot. It is essentially the permission to activate the license. There is no need

to record any user data, let alone create a user account. The only user information captured by the system is the serial number of the CmContainer in which the license has been activated, which is needed for updates or if the container is lost at some point.

The most basic function of WebDepot is the activation of licenses: The user enters the ticket and selects an available CmContainer for activation. If software-based CmActLicenses are the developer’s preferred license container, WebDepot recognizes if no soft container already exists and creates a soft container automatically on the user’s device. All these transactions between the user’s computer and the browser go through a WebSocket interface provided automatically by Code-Meter Runtime and supported by all modern browsers like Google Chrome, Microsoft Edge, or Mozilla’s Firefox.

Offline? No Problem!

Even in today’s hyperconnected world, there are cases in which a license needs to be acti-



vated on a device that is not directly connected to the Internet. For these instances, WebDepot comes with a special file sharing mode: The target computer for the license creates a context file for the chosen CmContainer, including the CmContainer's serial number and public key, a certificate to confirm the public key's authenticity, and any information about licenses already in the container (including a counter). The user takes this context file to a computer that is connected to the Internet, from where it can be uploaded to WebDepot. An update file with the chosen license updates is then prepared and ready for download, while the system runs several automatic processes in the background. The user brings that update file back to the target computer, which can now access the fresh licenses in the CmContainer. In a third, optional step, the user could create a receipt for the process, which comes in the form of another context file to confirm the update by uploading the receipt to WebDepot.

Coming back to the automatic processes: The data they need are the serial number and the counter contained in the context file. With the serial number or, more precisely, the public key, the system can be sure that the update file can only be imported into the CmContainer it is meant for. It could not be decrypted outside of that container, nor could it be moved into a different container.

The counter is then automatically increased for each license update. When a context file is uploaded, WebDepot passes it on to CodeMeter License Central, which reads the counter first and immediately confirms all updates up to the current count. CodeMeter License Central then checks whether there are any updates not yet confirmed and creates an update file to exactly match the status of the last missed update. In the last step, the missed updates and the new update are combined in a shared update file. CodeMeter Runtime also uses the counter to understand which updates have already been imported and skips any

redundant updates. This means that even if the user imports an outdated context file by mistake, the CmContainer is always updated to the most recent correct state.

Offline Made Easy

Push updates make life even easier for offline updates: They allow the user to select the right CmContainer from a list on WebDepot, removing the need for a context file of the target device altogether. The user only has to download the resulting update file and import it to the device, optionally with a receipt to confirm the transaction in WebDepot. A receipt is a good idea for support purposes, as it lets WebDepot know about the current state of the user's device and can slim down the next update file by skipping any unnecessary license updates.

Other Standard Functions

WebDepot also makes it easy for users to move their licenses from one computer to the next. To do so, the license is formally returned from the original device; once this has been confirmed with a mandatory receipt, the license can be reactivated on the new device. The same mechanism can be used to simply return licenses, even though there are

other and better options for this. Again, the developer decides whether the user has access to this function, which can be set individually for each license. Can this be limited to a number of instances or period of time? The answer should be clear from the tenor of this article: Flexibility – the standard setting sets no restrictions, but the system can accommodate any limit the developer wants to define as a rule.

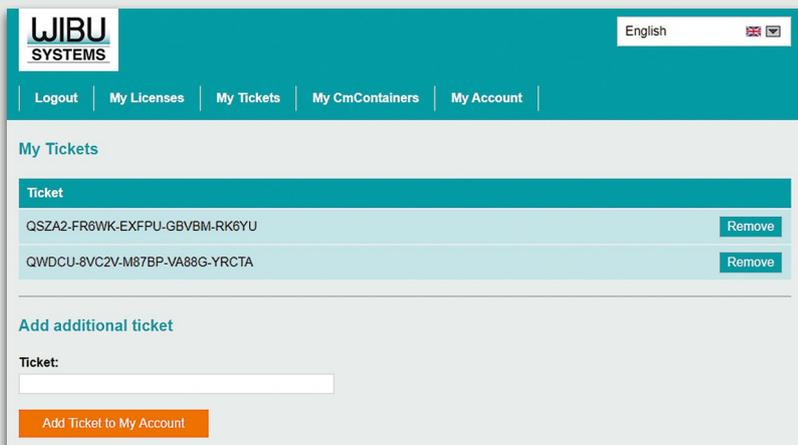
Like all earthly things, licenses are also prone to getting lost. Computers can crash, and a dongle can end its life prematurely as a dog's chewy toy. In these cases, the users can recover and reactivate their licenses to the extent allowed by the software's developer. The old license or the old CmContainer would then be blacklisted to prevent fraud.

Over their working lives, licenses might have to be changed or edited by the developer as well. This could be done to expand a license, to change it, or to withdraw it if a user wants to return it or has simply stopped paying for the software. All these changes can be delivered automatically in the actual CmContainer via WebDepot.

One relatively recent addition to WebDepot is the ability to renew checkpoint licenses. These are special licenses that are meant to act like permanent licenses but are technically limited to a specific lifespan. They need to be refreshed regularly, which can be done with a simple WebDepot action or, more typically, by a background process started by the Software Activation Wizard in the protected software itself.

Software Activation Wizard

All functions of WebDepot and most of the ex-



panded functions of the license portal kit can also be accessed from within the protected software itself, usually by way of a separate Software Activation Wizard. It communicates with a version of the license portal via a gateway, offering no GUI, but typically having the full range of features and abilities as the full license portal.

Portal or Wizard – what sounds like something out of a fantasy story is a simple question of use cases: A Software Activation Wizard is the perfect choice for users who will be online when licenses are updated automatically, which applies in particular to checkpoint licenses. WebDepot, on the other hand, can also be used to license software on offline devices, on top of other convenient features like a portable license overview. It is not a question of either-or, but of the right balance between portals and wizards to match the most likely use scenario.

User Administration

The top expansion module is user management, which offers two options: If the software developer has already established some system to manage the software’s users, the license portal can easily be integrated with that system, generally using OAuth2, SAML, or SOAP. The benefits are obvious, as the actual end user only needs one account.

If there is no user admin system in place or no interface available to integrate it with the licensing system, Wibu-Systems has prepared its own user admin module, including user registration capabilities, with a flexible choice of user data that the system would require, ranging from email addresses, to country, company domain, user names to many other options. The resulting database can, of course, be migrated to an integrated solution once it is available.

Technically, user admin means the allocation of tickets to one or more users. Instead of entering all tickets manually, the user simply logs in to the license portal to see a list of all tickets and licenses.

Multi-Level User Administration

A far more common type of user administration works with several tiers and levels of users, e.g. in the following typical cases:

- Education licenses for schools and universities (faculty to students)
- Resellers (resellers to end users)
- Commercial clients (administrators to users)

In these cases, there is a qualified administrator (e.g. a faculty member, a licensed reseller, or a system admin) who manages licenses from their admin account, which the licenses can already be allocated to by the original vendor if the administrator is known. The administrator can then assign and distribute the licenses to the end users or students as required, with the developer having the right to decide whether the end users can activate the licenses anonymously with a ticket or need to create their own account. This gives resellers an easy means for collecting information about end users. With the privacy rules of the EU GDPR in mind, this is done with due consideration for the principles of data minimization and the right to be forgotten.

Reselling Licenses

Users are sometimes given the right to sell their licenses on to other users. This can be necessary e.g. for companies selling on production machinery they no longer need. The new owner would need the license for the software running their new machine. This is possible with an additional option that allows the new owners to change the ticket to complete the license’s transfer. It works either by the ERP requesting this data or by the ERP system initiating the transfer process in the first place, with the old license taken back by the developer and a new license returned to the new user.

Internal Licenses

Many organizations want their members to have easy access to licenses without having to kick-start a complex process via the organization’s ERP system. There is an expansion module for this purpose that allows internal tickets to be used to create new single-user licenses. This bulk-ticket method can also be used for free demo or trial licenses.

Emergency Licenses

What happens when the maximum number of

license recoveries has been reached, or if the software vendor decides to allow no recoveries? In these cases, users can have the option of requesting a temporary emergency license via their license portal. The best practice for emergency licenses is to have them bound to the original ticket and limited to a duration of only a few days, but not limited in terms of the software’s features and functions. A limit can also be set to the total number of emergency licenses, with a threshold defined at which the service desk would be notified and given the power to decide on a case-by-case basis about each emergency license request’s merits.

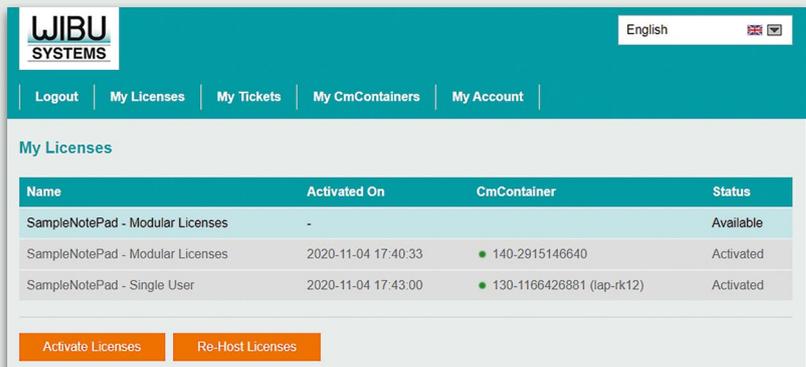
Emergency licenses can be created in CodeMeter License Central, or a dedicated emergency CodeMeter License Central can be operated at a separate site by Wibu-Systems. There has never been an incident that needed such a secondary system running in the decade since the service was introduced – but it is a great feeling to know that the option is always there.

Electronic Software Distribution

The newest member of the family is the Electronic Software Distribution expansion module, which is used to keep track of available software packages and the related user licenses. By comparing the version of the software installed by the user and the activated license, one can ascertain which of the following three cases applies:

- The user already works with the current version of the software.
- There is a new version of the software that the user could enjoy.
- There is a new version of the software, but it is not supported by the user’s current license.

In the latter case in particular, this information allows software vendors to make their users an attractive offer to move over to a new version. 



The screenshot shows the Wibu-Systems license portal interface. At the top, there is a navigation bar with the Wibu-Systems logo, a language selector set to English, and navigation links for Logout, My Licenses, My Tickets, My CmContainers, and My Account. Below the navigation bar, the 'My Licenses' section is displayed, featuring a table with the following data:

Name	Activated On	CmContainer	Status
SampleNotePad - Modular Licenses	-		Available
SampleNotePad - Modular Licenses	2020-11-04 17:40:33	140-2915146640	Activated
SampleNotePad - Single User	2020-11-04 17:43:00	130-1166426881 (lap-rk12)	Activated

At the bottom of the table, there are two buttons: 'Activate Licenses' and 'Re-Host Licenses'.



Portable Licenses in the Cloud

CmCloudContainers are the latest addition to the CmContainer family. Compared to hardware CmDongles and software CmActLicenses, CmCloudContainers live in the cloud, without the user having to have a local secure anchor. As with a CmActLicense, which is bound to a known device, the user can get going immediately, and as with a secure hardware CmDongle, the user stays fully mobile and can use the license on any device they want.

Bound to the User

CmCloudContainers are bound to known users. They have to sign in with the CodeMeter Cloud Server in the Wibu Cloud to prove who they are, using user names and passwords that are autogenerated by the CodeMeter Cloud Server and delivered to the user in the form of a special credential file. The users can then import this credential file to any device they want to be working on.

The licenses themselves are safely tucked away in a secure CmContainer on the CodeMeter Cloud Server. When the credential file is imported by the user, it is linked with the local device; the local CodeMeter Runtime essentially mirrors the contents of the CmCloudContainer and notifies the CodeMeter Cloud Server whenever the software is indeed used on the local computer. All encryption and decryption operations also happen in the cloud to make sure that users can only use as many licenses as they actually own.

Online or Offline?

This immediately answers one fundamental

question: "Do users of cloud licenses have to be online all the time?" Since the cryptographic operations happen in the cloud, encrypted software can only launch if their users are indeed online. However, if the software is not encrypted at all or has already been decrypted, it is up to the vendors to decide what happens when a user is no longer connected to the Internet. They either give the user the benefit of the doubt and tolerate this, or they force their software to stop working after a number of failed connection attempts.

There is the option of using CodeMeter Protection Suite IP Protection to encrypt the software and set a certain degree of tolerance with the CodeMeter Core API. This would encrypt the software, but also place the decryption key in the software itself, allowing it to start even if no license is present. The software can also be set to conduct license checks at regular intervals and to only react if a threshold number of connection attempts or a defined time since the last successful check has been passed.

Software that needs to run offline and still comply with tough security standards can always use a CmActLicense or CmDongle, two container types purpose-built for such a situation.

Multiple Users – One CmContainer?

In some scenarios, a CmCloudContainer is meant to be used as a multi-user license, as can be done with a CodeMeter network server. This is not only possible with CmCloudContainers; the new container even offers two alternative options. The first option is for a system admin to set up a CodeMeter network server to import the credential file to, removing the need for the end users to have online access to the CodeMeter Cloud Server. The network server now functions as a type of proxy, which also means that access controls and usage statistics can work just as they do with CmDongles or CmActLicenses on a CodeMeter network server. The credential file needed for this purpose is kept in a single central place that is managed by the administrator.

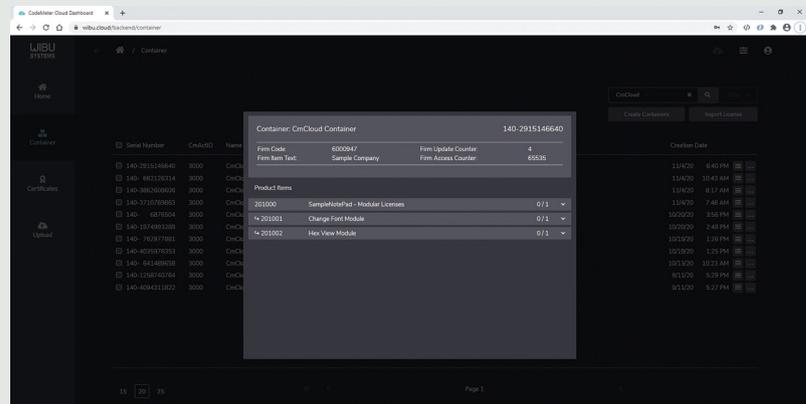
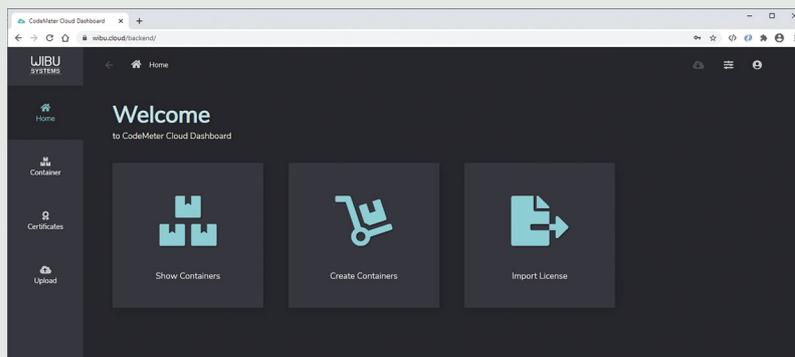
The second option is for the end users to access the same CmCloudContainer from their computers. In this case, the credential file is copied to each of their computers. To prevent fraud, the credentials would also have to be changed on all of these computers if e.g. one computer is stolen or a user leaves the group. The usual access control and usage statistics functions would also not be available with this arrangement. Despite its apparent advantages, the second option therefore has definite drawbacks compared to a central CodeMeter network server, and it breaks one of the fundamental principles of good password management: People should not share passwords. It might even be better to give each user a separate CmCloudContainer with licenses dynamically distributed between them by CodeMeter License Central.

Costs are a factor to keep in mind: Five users accessing one CmCloudContainer at the same time consume the same amount of energy as five users with five CmCloudContainers. This simple fact is reflected in the Wibu-Systems' pricing model, which treats the choice between one or multiple CmCloudContainers as a merely technical rather than a financial decision.

CodeMeter Cloud Dashboard

Software vendors who wish to provide CmCloudContainers to only a select group of users can benefit from CodeMeter Cloud Dashboard as the perfect tool for the purpose. After signing in, they have the following options:

- Creating new CmCloudContainers: A credential file is created with the name chosen by the vendor.
- Creating new credentials: This creates a new credential file for an existing CmContainer, which invalidates the previous credential file, but not the licenses already stored in the CmCloudContainer.
- Creating a context file: This creates a context file for a given CmCloudContainer,



which can be used to create or edit licenses with CodeMeter License Central, CodeMeter License Editor, CmBoxPgm, or other proprietary tools. The same type of file can also work as a receipt for the purposes of CodeMeter License Central.

- Importing an update file: An update file is imported to transfer licenses into a CmCloudContainer.

License Portal

Creating and distributing CmCloudContainers to large numbers of users can be done manually, but this would be a laborious and unnecessary choice. It is better to go with the license portal of CodeMeter License Central: Users can sign themselves in with their username and a password, which could even be linked with an existing user management system. To prevent spam, users may have to possess a valid ticket before they are allowed to create an account.

When users then want to use licenses in the cloud, the license portal reaches out to the CodeMeter Cloud Server and creates a credential file in the background. The file can be stored in encrypted form on the license portal, from where the user can download or import it directly to the target computer.

The license portal enables users to place their

licenses in a CmCloudContainer, a CmDongle, or a CmActLicense, depending on the preferred choice of the software vendor. The portal can also be used to move licenses from one container to another, for which users would have to return their licenses e.g. from a CmCloudContainer to CodeMeter License Central and then move them into a CmActLicense if they wish to use the licenses offline in future.

Other Devices

Users that want to use their license on another computer can simply download or import their credential file directly from the license portal. They do not have to activate their licenses again, as the licenses stay in the same CmContainer they have always been in.

New Passwords

Whenever users are worried that their credential files might have been stolen or otherwise abused, they can turn to the license portal to request a new credential file. A message to say that a license is already in use is a typical sign of such a theft if the user is sure that the software is not indeed in use, not even on another system.

When the credential file is changed, the password also needs to be changed via the license portal. To do so, the user simply requests a new password and is then given a new credential file to import to the target devices – and everything is secure and back to normal.

Software Activation Wizard

All these functions, from creating CmCloudContainers to changing passwords or activating licenses, can be done through the license portal, or they can be accessed from within the licensed software itself. All this needs is the integration of a Software Activation Wizard in the software that can communicate with the gateway, a special version of the license portal without a visible user interface.



CodeMeter Protection Suite – A Tool for All Seasons

How do you protect software from reverse engineering? How do you make sure that your users pay the licensing fees they owe you? You come up with a great application for your users – and we give you the tools you need to turn it into a profitable commercial success.

CodeMeter Protection Suite brings together the best tools to encrypt applications and software libraries automatically, to protect executables from reverse engineering, and to shield your invaluable IP from the prying eyes of your competitors.

There are tools perfectly suited for each target platform and for the many needs of different formats, giving you the best possible protection with the least possible effort. The technology works by modifying executables to first load the code they need for decryption, for which Wibu-Systems deliberately uses standard algorithms: in encryption, the key should matter, not the algorithm, which makes finding the right key the essence of the entire exercise. The key is made up of several pieces, with most contained in the software's license. It is derived from the combination of the correct Firm Code and Product Code and is an integral part of the decryption process, as are the hash values calculated by the protected file itself.

IP Protection

The only tool deviating from this principle is the IP Protection mode, which is designed

exclusively for protection against reverse engineering without any need for licenses. The solution is particularly well-suited for trial or demo software or for freemium models if it is combined with some license-based encryption. KEYnote issue 38 included a dedicated article all about this special mode and the use cases it is meant for.

AxProtector and IxProtector

Native Windows, Linux, and macOS applications are easily encrypted with AxProtector, which works by completely encrypting the entire executable code. After it is decrypted with the key derived from the license and the embedded values, the application can run as normal, with the same speed you are accustomed to from unprotected software. All flavors of AxProtector also come with regular license checks as standard as well as special security mechanisms to ward off debugging or other common hacking attacks.

IxProtector finetunes the operation and encrypts individual functions separately, either with the same encryption data from the license or another key. These protected func-

tions are decrypted and executed dynamically while the application is running, either automatically or specifically requested by the software protection API (WUPI). Accessing the protected functions without decrypting them first would cause the application to crash immediately. Particularly sensitive code could also be configured to be moved onto a CmDongle for execution in a highly secure environment.

AxProtector .NET

Assemblies, i.e. applications written in C# or another .NET language, are translated into an intermediate language for delivery, which is easily readable and readily decompiled. To counter the inherent weakness of this approach, AxProtector .NET uses a different type of encryption process: It encrypts the actual contents of methods in separate data, leaving only a stub code in the method that initiates the decryption when it is executed. This keeps the protected program a valid .NET assembly, while the code is securely encrypted.

This approach requires decryption whenever a method is used, which normally affects perfor-

mance. This is why AxProtector .NET includes different options for encrypting or not encrypting individual methods or entire classes to find the right balance between protection for your intellectual property and performance for your users. These settings are easy to configure with annotations in the source code or with the AxProtector configuration file, giving you immense freedom of choice. You can ramp up the level of protection to even require separate licenses for individual methods or classes, paving the way for truly modular protection.

AxProtector .NET Standard

.NET Standard was introduced to promote standardization between the many different .NET implementations, bringing a standard API that can be accessed from any platform. An assembly programmed with .NET Standard can be used in the various frameworks without having to be compiled anew every time. Wibu-Systems decided to support the automatic encryption of .NET Standard assemblies long ago and has been adding new capabilities with every new version of .NET Standard, now up to the current version 2.1. Its protection approach uses the same process as AxProtector .NET.

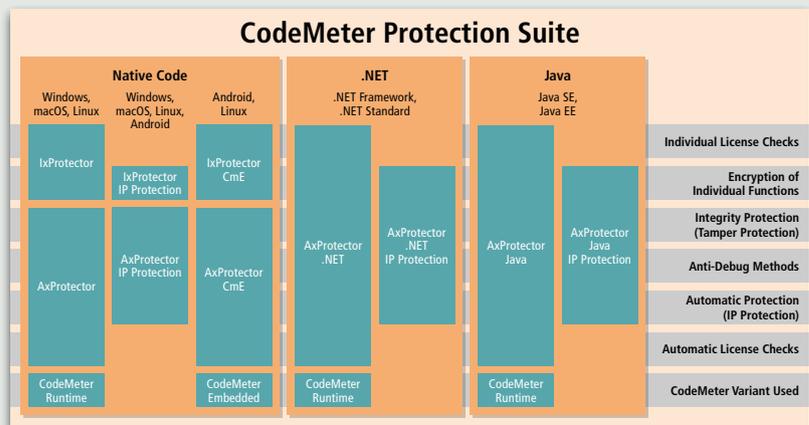
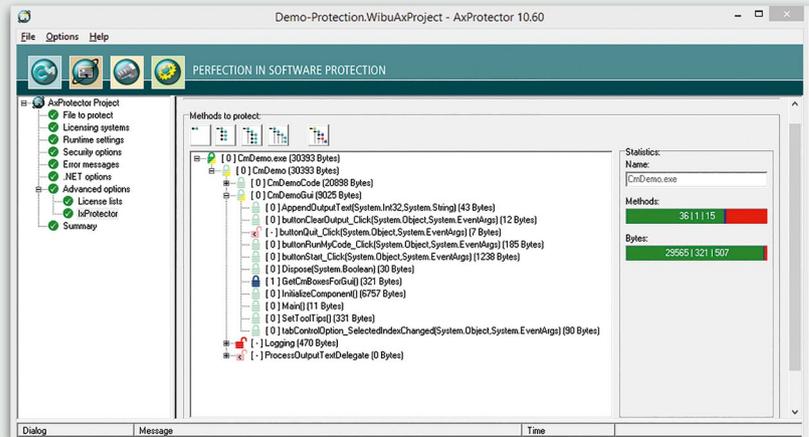
AxProtector Java

Not unlike .NET code, Java source code is first translated into an intermediate language, called the Java Byte Code, which is platform-independent and translated for execution by the Java Virtual Machine (JVM). As with .NET, AxProtector Java encrypts each method separately and loads and decrypts it on the fly when they are needed.

Simple to Use

All flavors of AxProtector are available as command line tools to make them perfect choices for automated build environments, easily managed and tailored for the intended use with simple settings in the configuration files. A GUI is available to make it easier for first time users to get into the world of automatic encryptions and create these configurations, allowing them to simply select the options they want. This also accounts for the special requirements and capabilities of each protection mechanism, e.g. listing the .NET methods that could be excluded from encryption or assigned another license.

A user message interface is available for all AxProtectors if e.g. the right license is not available or certain restrictions, like the choice of server, should apply for a license. It can display



messages for the user or offer the opportunity to activate the missing license. Wibu-Systems has prepared a range of user message libraries, which can still be customized via their configuration files. The interface could also be used to provide libraries in your own corporate design.

Always Evolving

The specialists at Wibu-Systems never stop improving and refining all parts of CodeMeter Protection Suite. This means more than just adding new mechanisms to offer even higher levels of protection. Performance is always top of mind with our developers. Would-be attackers progress with the times, and protection that was sufficient three years ago might be easier for them to beat today. With this in mind, Wibu-Systems keeps at the forefront of technological developments to give you and your products stronger and more perfectly matched protection capabilities every time. You can trust our expertise!





Flexible Network Licenses

As 2020 slowly draws to a close, the Coronavirus still dominates the world's headlines and continues to affect the lives of people everywhere. Working from home has become the new normal, and many companies have had to ask themselves: How can we give our people access to licensed software in their home offices that would normally only be used on our premises? Do we need to buy additional licenses for every employee?

Working from Home

With their people working remotely, from their home office or a mobile office, virtual private networks (VPNs) are the means of choice for companies to give their employees secure access to internal software and data at home or at a client. Even if the employee in question has no dedicated work laptop, a smart VPN can provide them with a remote desktop that keeps the actual data in the safe environs of the company network and only broadcasts the specific screen contents to the user in the field. However, this requires a sufficiently powerful infrastructure and considerable network bandwidth.

If such a direct and secure connection is not feasible or not planned, there are other options for giving users access to licensed software by providing the necessary licenses through the cloud. Wibu-Systems has pioneered this option with its cloud-based licensing technology (KEYnote 38): The software is installed on the physical device of the user, but the required license is kept and checked on a Wibu-Systems cloud service. The user now only needs

to stay connected to the Internet to use the software.

In essence, it doesn't matter whether the types of licenses offered by Wibu-Systems are kept on a network server, a local system, or in the cloud. They were always designed with flexibility in mind – to the extent that the software developer or vendor is comfortable with. The real distinction between different licensing models lies in whether or when an (additional) license would be assigned to a user.

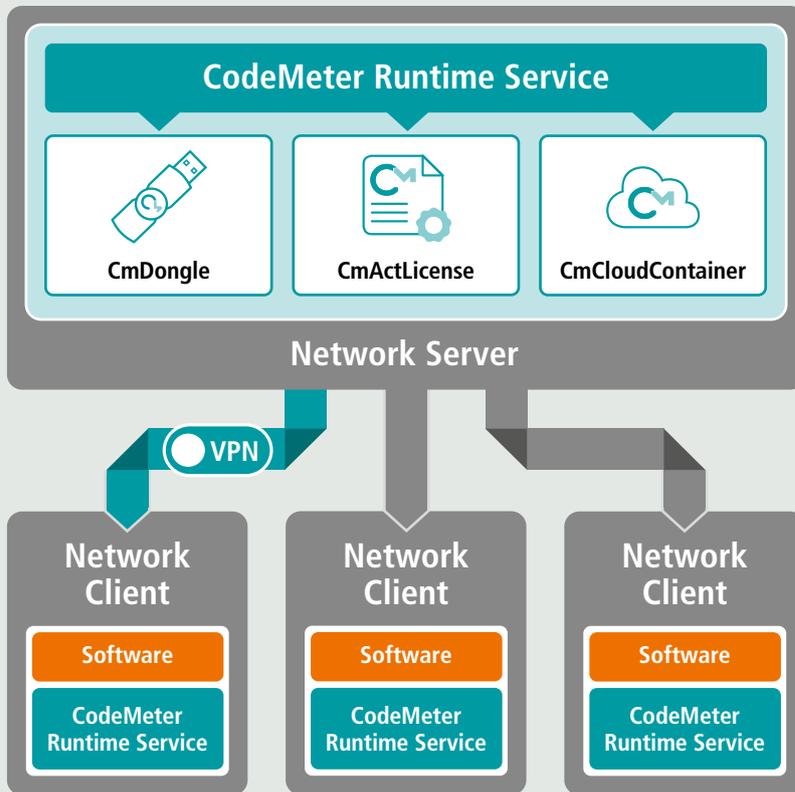
Shared Licenses

Sharing network licenses is a great option for licensing software that many corporate users need on a regular basis, but not all at the same time. An excellent case in hand is a Customer Relationship Management system (CRM) that is used to manage customer data: Such systems are accessed constantly and regularly revised and updated, but each specific user, be it from sales, customer support, finance, or wherever else in the organization, would only access the CRM for a few minutes at a time.

Wibu-Systems offers the ability to license software and enforce licensing conditions via a shared network server. Users can share the software as they are used to doing e.g. with car sharing, giving lots of seats access without forcing the software to be tied to any one seat or any one user. The number of licenses available for simultaneous use is predefined and strictly enforced. This gives the user perfect control over the costs while still protecting the licensed software effectively for its developer. The three most common models for this purpose are:

- **User Limit:** Whenever a copy of an application is started, one license is activated. The software can be installed on any number of devices; CodeMeter itself makes sure that only the maximum number of licenses can be in use at any one time.

This model is a good choice for software that is used once per device or for software running in multiple instances on the same device, with a license active for each active piece of software.



None of these models is affected by the physical location of the user: whether the software is used on a local device or launched remotely via the network, all the user needs is a connection to the license server.

The license checks also work across platforms, allowing random combinations of client and license servers: Linux servers with macOS or Windows clients, or vice versa.

Security

CodeMeter is packed with cutting-edge technology to protect the intellectual property of software developers by preventing licenses from being unlawfully copied or multiplied.

Every device running protected software is given a Wibu-Systems runtime component to handle the communication with the central license server. This server makes sure that only the actually available number of licenses can be used at any one time.

The licenses themselves are kept either in hardware containers (CmDongles), in soft licenses cryptographically bound to the fingerprint of the target device (CmActLicenses), or in the cloud (CmCloudContainers). 

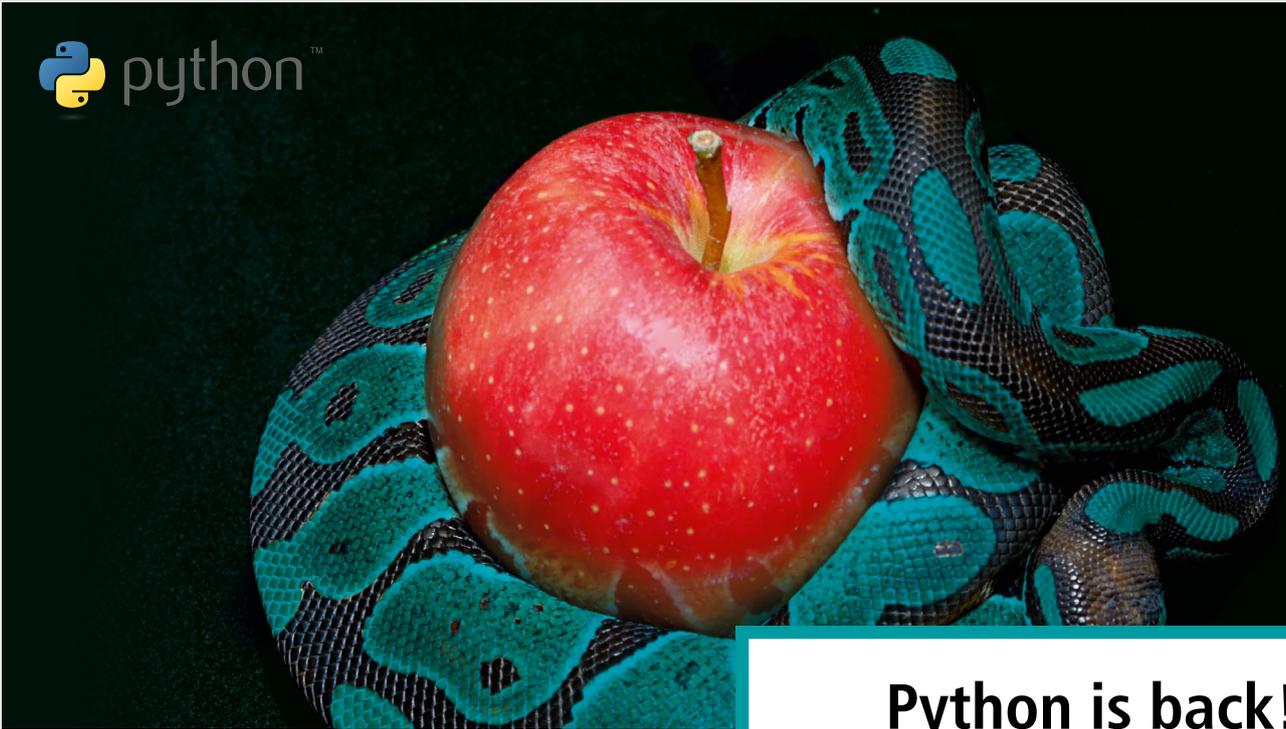
- Station Share:** For this model, the license on the server is activated once per device: if a user starts several copies of the application in question, they still only need one license. This works on single workstations as well as on terminal servers.

Station Share is an ideal choice for software that starts a new copy for each project. For instance, the users of CAD applications can then open additional projects (and applications) to compare information or copy data – and only ever need one license in place. Despite this flexibility on each workstation, the rule still applies that no user can use more than the available number of licenses.

- No User Limit:** This license is used to offer software without restricting the number of users, which can be a great choice for libraries or DLLs that are accessed by several modules of a larger software pack-

age and therefore have to run in multiple instances at the same time.

Client	CmContainer	Firm Item	Product Item	Access Mode
CustomerSupport\Tom	Demo Container	6000010 : Sample Company	201010 : Sample App	Station Share
Finance\Heinz	Demo Container	6000010 : Sample Company	201010 : Sample App	Station Share



Python is back!

But how do you protect and license Python applications?

The TIOBE Index (<https://www.tiobe.com/tiobe-index/>) charts the world's most popular programming languages, and it currently puts Python in third place, hot on the heels of the perennial champions C and Java. Python is riding this crest of popularity because of its simple-to-use APIs and the sheer range and quality of its cutting-edge libraries in the field of artificial intelligence and machine learning.

There is no light without shadow though, and the added comfort for developers is paid for with worries about the security of their intellectual property. Some Python applications keep the code in plain text form, visible to all until it reaches the interpreter; others include precompiled code, which is particularly easy to decompile. Invaluable digital assets, like an AI learning algorithm, are easy prey for would-be attackers.

Modules or packages like "cx_Freeze" that are

used to create executable binaries are no real obstacle for any hacker worth his or her salt. Their contents are easily extracted and the source code captured with tools that are freely available in the community. Obfuscation hardly offers any effective protection beyond that.

This is why Wibu-Systems has committed itself to a strategy of encrypting the sensitive parts of a program with CodeMeter Protection Suite, using the established interfaces of Python and the energy of a vibrant and very active community.

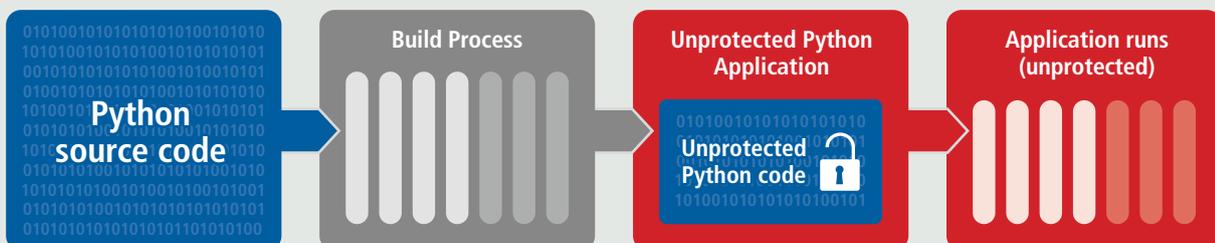
Integration made easy

Python has a lot to offer beyond the capabilities of a modern high-level script language, with great potential in machine-oriented applications. C extensions can be used to move selected functions into binaries in the more performance-driven C: the best of both worlds,

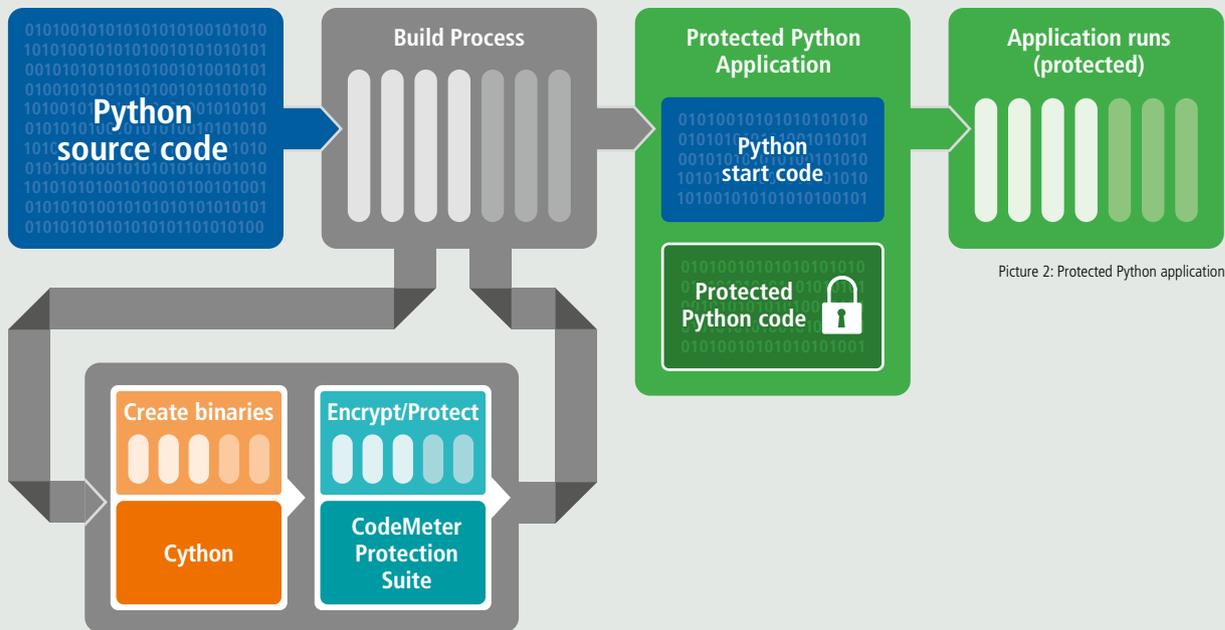
with the more comfortable syntax of Python and the performance of a C application.

Wibu-Systems' technology is a perfect fit for this type of outsourced functions: CodeMeter Protection Suite was developed with library files like .dll and .so in mind and can be used without any restriction for either type.

This not only means that the Python code is properly encrypted, but also that any CodeMeter protection mechanisms like its integrity protection, anti-debugging, or anti-reverse-engineering capabilities can work their magic in Python applications. C extensions can be auto-created from the Python code by using the third-party Cython module, which translates the code into Cython and generates interim compiled files to keep the process transparent and in full control of the developer. The package comes with a simple analytical tool



Picture 1: Unprotected Python application



Picture 2: Protected Python application

```

23 def check (self):
24     cmacc = CodeMeter.CMACCESS2()
25     cmacc.mulFirmCode = self.firmcode
26     cmacc.mulProductCode = self.pc
27     cmacc.mfCtrl = CodeMeter.CM_ACCESS_STATIONSHARE
28     fCtrl = CodeMeter.CM_ACCESS_LOCAL_LAN
29     hcmsc = CodeMeter.CmAccess2(fCtrl, cmacc)
30     if hcmsc == 0:
31         return False

```

Picture 3: The "CmAccess2" function

included to recognize and recommend performance improvements in the code. The end result, .pyd files, are similar to the well-known .dll files for Windows or .so files for Unix systems.

Licensing as the next step

Since the application comes in encrypted form, it is already perfect for licensing. More and more users are turning away from monolithic package deals in favor of models that allow them to pay only for the modules they need, either for a certain time period or for a certain number of uses. This gives users access to the software even if their pockets are not quite as deep, and it is a great deal for both sides – users and software developers.

CodeMeter Protection Suite comes pre-packaged with all of the settings and configurations needed for this, putting modern and flexible licensing models at the disposal of all developers.

Integration with CodeMeter API

In addition to encrypting the application's code, the CodeMeter API can be integrated, easily

and comfortably, right into the Python code.

CodeMeter API is a licensing and cryptography interface used for the following operations:

- Checking licenses
- Reading license properties
- Logging into other systems
- Encrypting communication
- Symmetrical and asymmetric cryptography
- Hash functions and challenge-response actions
- Encrypting own data in the Python code
- Encrypting configuration or other data files

The "CmAccess2" function offers direct access to licenses from within the Python code to support several licensing models, as illustrated for the "check" method in Picture 3.

```

33 cmcrypt = CodeMeter.CMCRYPT2()
34 Data = CodeMeter.c_ubyte*16
35 data = Data(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16)
36 result = CodeMeter.CmCrypt2(hcmsc, 0, cmcrypt, data,16)
37 CodeMeter.CmRelease(hcmsc)
38 if result != 16:
39     return False

```

Picture 4: The "CmCrypt2" function

"CmCrypt2" can be used to encrypt data, applied in Picture 4 to a 16-byte buffer.

There are signs of a surge in interest in ways to protect Python applications, and Wibu-Systems answers the market's call with its constant improvements and additions to CodeMeter Protection Suite and continuous exploration of new use cases.

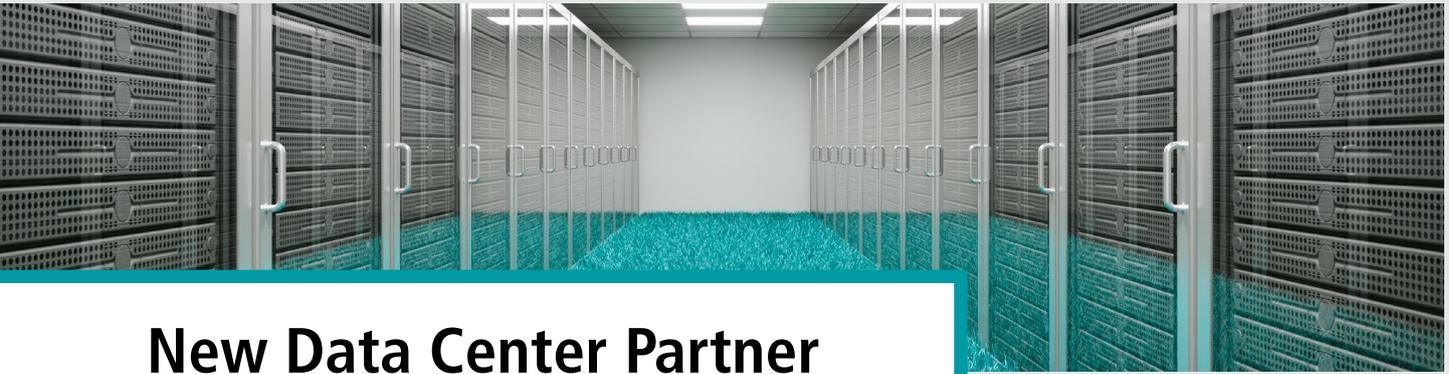
Our curiosity keeps us exploring, and Python offers us a lot to discover.

ALERT

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New Data Center Partner

In August 2020, the Wibu Operating Services (WOPS) officially arrived in their new home: WIBU-SYSTEMS AG's very own data center. From the initial evaluation and planning to the completed migration, the twelve-month effort could not have been the success it was without the professional cooperation and goodwill – and the patience – of the clients who joined us on this journey. Thank you!

Background

The decision to move to a new data center partner was born from a number of reasons, not least of which, the great growth record of Wibu Operating Services. As more and more clients benefit from our services, their needs and requirements also grow in scale: High availability and 24/7 data center operations have long been standard, but more attention has shifted to information security management (ISMS) concepts, business continuity management (BCMS), data protection (EU GDPR), or security in the cloud, all coming with a profusion of national and international certifications.

CmCloud also brings new challenges for Wibu Operating Services. It needs powerful clustered in-memory database systems whose operation depends on ready access to external expertise. The technical processes happening in the background also have to become far more efficient as the number of systems multiplies, but real IT talent remains in short supply.

Wibu-Systems resolved to tackle the challenges head-on with the decision to move to a new data center partner, without any changes to or effects on the standards of service guaranteed by our existing hosting contracts.

The New Partner

After careful evaluation and deliberation, we chose to go with Claranet GmbH in Frankfurt. Claranet operates two data centers in the city, keeping the data of our clients within the territory of the Federal Republic of Germany and protected by the rights and assurances of German law. The Claranet Group maintains other data centers across Western Europe, potentially opening an avenue for international expansion

or geo-clustering. Our new partner's repeat ranking as a "Cloud" leader in the Gartner® ranking is testament to Claranet's abilities.

Advantages

The decision in favor of a new data center partner allows Wibu Operating Services to take its service quality to a new level for our clients. To name just a few improvements:

- The two previous redundant carriers are now expanded to a full quartet.
- The technical team of the data center has grown considerably with new talent.
- The Wibu Operating Service team has access to more comfortable and efficient tools that will make installation and maintenance processes a breeze.
- The systems have become easier to scale; resources can be added online without needing to wait for a maintenance window.
- A best-in-class admin platform is in place to make tasks more efficient or even fully automated (API). This promises a faster and more efficient response to our client's special requirements.
- Wibu Operating Services offers a new and expanded technical portfolio (e.g. penetration tests).
- Many services can now be offered in certified form.

Certifications

With the aid of our partners at Claranet, Wibu Operating Services now possess the following certifications and proofs of compliance:

- ISO/IEC 27001:2013 (ISMS)
- ISO/IEC 27018:2014 (Cloud)
- ISO/IEC 27017:2015 (Cloud)
- ISO/IEC 22301:2012 (BCMS)
- ISO 9001:2015 (Cloud)
- SOC 2 Type II Report in accordance with ISAE 3402 (Quality)
- CSA STAR CAIQ Version 3.0.1 (Security)
- Trusted Cloud Label of the BMWi
- CHECK 28 data protection audit (DSGVO Art. 28)

For more information, visit <https://www.claranet.de/compliance>.

Improvements

As part of the migration, virtually all CodeMeter License Central installations of our clients were moved to the most recent version. Any cases that could not be updated immediately due to custom changes or adjustments were moved into a special network zone for the transition period to prevent any disruptions or interference between installations. Monitoring has been optimized again for CodeMeter License Central, made possible by the redesign of our key systems (reverse proxy server, load balancer, database cluster). 

Wolfgang Voelker Director Wibu Operating Services

"We are proud of the even better quality and greater range of services we can offer our clients now. The WOPS team is looking forward to exciting new projects to take on, with the great capabilities of our new data center partner."



Case Study | Takebishi

The Challenge

Takebishi, the Kyoto-based total solutions provider, distributor and evangelist for Mitsubishi Electric Corp. factory automation technology, is readying its flagship industrial communication middleware DeviceXplorer® OPC Server for the smart factories and connected industry of the 2020s with a major new version upgrade. With its business growing both in its native Japan and around the world and unauthorized use an increasing concern, the invaluable intellectual assets invested in the system call for a licensing solution that is as smart and sophisticated as it is reliable and easy to use.

The Solution

Takebishi decided to replace a mix of proprietary and third-party licensing systems that were each addressing a specific aspect but were not interoperable as a whole. Instead, they integrated CodeMeter with both hardware and software licensing managed under the same technological umbrella, achieving the flexibility needed to cover every scenario among its diverse industrial user base – online or offline, virtual or cloud environments, hardware containers for top security or software containers for the added comfort of online license transfer and activation.

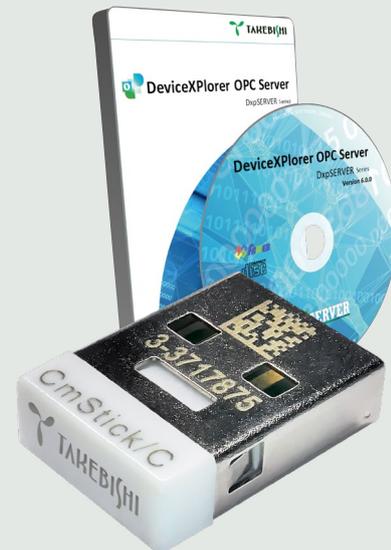
The Result

With CodeMeter fully embedded in the newest version of DeviceXplorer® OPC Server, the company's flagship industrial communication

middleware is free from concerns against unauthorized use and piracy. With 20% of its products already shipping overseas, Takebishi now enjoys the ease of use and versatility of CodeMeter's integration and flexibility in adapting to new usage scenarios employed by its clients around the world, including virtual environments, and full support for Docker – right on time to prepare for the launch of Takebishi's DeviceGateway® on Docker.

The Company

With a long history going back to 1926, Takebishi has become a household name in its native Kyoto and Shiga region as a vendor of cutting-edge and high-quality solutions for factory automation. With the distribution of the technology by Mitsubishi Electric and many other partners, as well as the commercialization of its original solutions, and as a proud member of the OPC Foundation, Takebishi is increasingly supplying technological excellence and expertise to clients around the world.



Dxp SERVER

Takumi Ishida

Manager System Solution Development, Takebishi

"It makes me very proud to introduce CodeMeter to DeviceXplorer® OPC Server Ver.6, our main product that is used widely in Japan and overseas. A strict management of licenses, combined with flexibility in how licenses are used, was indispensable as we continue to grow our sales. CodeMeter offers both and made the switch from the licensing algorithm we had developed easy. I would love to further expand our product features with CodeMeter's broad capabilities."

Wibu-Systems Training

Wibu-Systems offers custom training to get you off to a running start with CodeMeter software protection and licensing. The training is offered in the form of company courses, typically hosted as in-house classes on your premises. The standard training program includes three days of courses, which can be adjusted to your needs and level of expertise. You can pick and choose the contents you need and shorten the program to 1 or 2 days. Alternatively, you can add a hands-on workshop to allow your participants to try out their own practice cases.



www.wibu.com/tr

Available Courses

CodeMeter Core Features

- CodeMeter at a glance
- Configuring licenses
- The components of CodeMeter Runtime
- Use as a network server

Software Integration for .NET Assemblies with AxProtector .NET and API

- Encrypting .NET assemblies
- Encrypting individual classes and methods
- Integrating Wibu Universal Protection Interface (WUPI)
- Using CodeMeter Core API

Back Office Integration with CodeMeter License Central

- Configuring products
- Creating licenses
- Integrating license activation in applications
- Setting up and configuring license portals

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As trade shows are still unlikely to take place in the upcoming months, we will intensify the pace of our monthly fully immersive masterclasses. Each session focuses on unique content and is designed for beginner, intermediate, or advanced users of our CodeMeter technology. The 2021 season will initially cover the latest features and functionalities introduced in the following areas:

- Protecting Python applications
- Licensing in the cloud for on-premise applications
- CodeMeter License Central's new major release
- Using CodeMeter with embedded devices
- Protecting .NET applications
- Licensing HTML 5 applications

Watch out for our forthcoming announcements either on our website or via newsletter and get ready to register for the sessions that are most helpful to you.

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