



KEYnote 34

THE WIBU - MAGAZINE

Monetize your software with new business models

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- Top-Notch Protection with Translocated Execution
- CodeMeter Embedded 2.0 - New Features



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Dear Clients and Partners!



Digitalization has arrived in every part of our society: Traffic and mobility, banking, the Internet of Things and Industrie 4.0, digital medical technology, and education. The issue of data sovereignty has massive implications, including the question of who owns our data in the event of bike rental, financial records, production of machines, or medical devices. Germany's federal government hosted the Digital Summit in June with special emphasis on the pressing topics of healthcare and medical science. We joined Infineon Technologies, the maker of the security controllers in our CmDongles, and Fritz Stephan GmbH, producer of intensive care ventilators and one of our clients, for a practical demonstration. We showcased how the confidentiality and integrity of sensitive patient data could be maintained, the features of the ventilators customized at the point of need, and new business models introduced. It was an impressive show of CodeMeter's immediate benefits for patients, hospitals, and medical device makers alike.

Medical devices need to be protected against piracy and manipulation. Flexible licensing also offers substantial added value. This KEYnote will tell you about the Agfa HealthCare's success story with computed radiography. We are contributing actively to the Medical Technology working group of the VDMA and highlighting our comprehensive solutions at several exhibitions over the next few months, including Medtec in China, Medica/Compamed in Duesseldorf, Germany, and MD&M West in Anaheim, California.

Read this issue of our KEYnote to find out more about CodeMeter Cloud Lite, CmEmbedded 2.0, the results of our Blurry Box Hacker's Contest in May 2017, and the new ticket system for our technical support. It's an inspiring read!

Maybe we will meet at one of the many conferences and expos in the fall?

Your Oliver Winzenried

CEO

Blurry Box Hacker's Contest



Hundreds of eager participants from all over the world took part in our latest hacker's contest. Their mission: To crack the Blurry Box® protection for a game application to work without its license. Blurry Box is a novel protection technology that relies on fully public encryption mechanisms. The end result: Not a single hacker managed to break the new technology.



For three long weeks, the contestants labored away at the challenge. Two indeed managed to send meaningful results to the independent jury, including Professors Dr. Thors-

ten Holz and Dr. Christof Paar from the Horst Goertz Institute (HGI) and Professor Dr. (TU NN) Norbert Pohlmann from the Institute for Internet Security if(is). Neither hack actually broke the Blurry Box protections. The jury decided to withhold the €50,000.00 prize money, but both entrants were granted €1,000.00 in recognition of their effort. The remaining prize money will go towards more research and development in the area.

Blurry Box was developed by the Competence Center for Applied Security Technology (KASTEL) at the Karlsruhe Institute of Technology (KIT), the Research Center for Information Technology (FZI) and Wibu-Systems and took first prize at the 2014 German IT Security Awards. It has been integrated in CodeMeter and its capabilities have been proven publicly in the open contest. The technology, based on seven special mechanisms, duplicates, modifies, and encrypts individual functions in a program and selects the right variant only during runtime, with due consideration for the program flow. It also limits the rate of decryption. When a function is called up, only that function will be decrypted, while the other functions remain locked away in the memory. Decrypting a function that is not

actually required will lead to the automatic termination of the license, making brute force attacks impossible. The effort that would-be hackers need to invest to crack the protections is higher than the work that would go into developing the program from scratch. For a vivid explanation of the mechanism, Wibu-Systems has produced a special animation video: <http://www.wibu.com/bb>.

Professor Dr. Joern Mueller-Quade, Director of the Institute of Cryptography and Security at the Karlsruhe Institute of Technology (KIT), explains the thinking behind the contest: "The results of the hacker's contest make me proud. However good our analytical work beforehand, real-world security depends on how well our theoretical models match the reality out there. We can only know this by observation and empirical experiments. Even theories benefit from hacker's contests. Our IT security research at the KASTEL competence

center sees systems holistically and considers many different disciplines and methods. Blurry Box is a perfect example of this."

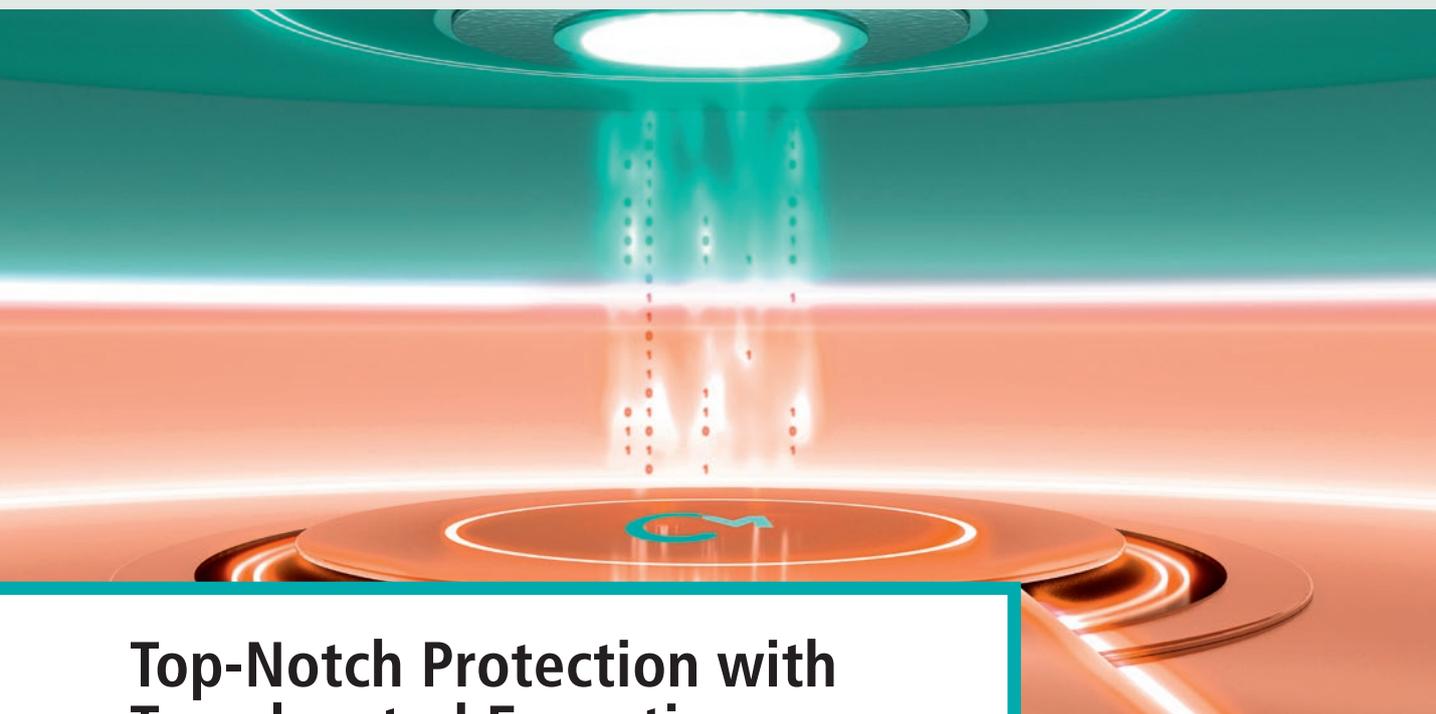
Blurry Box is being integrated in AxProtector, IxProtector, AxProtector .NET, and AxProtector Java. Parts of its features, specifically traps and the encryption of individual functions, are already in use, and more features will be added – a good reason to always stay up to date and use the newest version of CodeMeter Protection Suite.

Greater security is usually coming at the price of lower performance. This means that some of the more computing-intensive features of Blurry Box will only be working with local licenses.

Blurry Box vs. CodeMoving: Who wins?

Blurry Box and CodeMoving are not mutually exclusive. In fact, Blurry Box uses CodeMoving to select the next method on the CmDongle. However, traditional CodeMoving typically works slowly and the protected functions are trivial. With Blurry Box, CodeMoving truly comes into its own. Even complex functions can now be protected, and only the choice of variants is made on the CmDongle. This makes Blurry Box readily scalable with continued acceptable performance. 





Top-Notch Protection with Translocated Execution

“A wrapper that encrypts software can be circumvented by using a memory dump. You just wait until all parts of the application are decrypted, and then you dump it.” This statement might apply to many simpler products, but not to CodeMeter Protection Suite. This article shows you in detail why Wibu-Systems is the better choice.

The First Layer: AxProtector

AxProtector wraps around each executable and runtime library of your application as a layer of protection. You define whether you want to encrypt all modules or only specific executables. AxProtector is available as a command line tool and can be integrated without much effort into your automatic build system as part of continuous integration.

The executable file is analyzed and encrypted completely by AxProtector. AxEngine – a runtime component that handles decryption when your application is launched – is added to the executable. The Original Entry Point (OEP) is changed to start AxEngine first when the application is started. If the right license is available, AxEngine accesses that license and uses the key in it to decrypt the executable code in the memory. It is a common misconception that this is not allowed, which comes from the fact that poor implementations in the past produced flawed results. For CodeMeter Protection Suite, this has always been the normal course of operations.

Without the right license, that is, without a fitting key, decryption is impossible.

This sets AxProtector apart from simpler protection tools that use a set key and make the question of protection a simple yes-no decision.

AxProtector is available for Windows, Linux, x86/x64/ARM, Android and macOS.

Automatic Anti-Dumping Methods

Simple encryption as described above does not do much to protect against memory dumps. This is why AxProtector and, in particular, the AxEngine anti-debugging and anti-dumping mechanisms are integrated as a second layer of protection.

Encrypting the resources of your application is one starting point: The resource section of your software is kept in encrypted form in the executable. It is not decrypted when the application is started, but remains encrypted. When analyzing your software, AxProtector will pinpoint every instance when it accesses these resources. These are then redirected to AxEngine. Your application can use its resources transparently in the background, but a memory dump would

only return encrypted resources that cannot be used without the right key for the right license.

A second mechanism is the identification of common hacking tools, like memory dumping or debugging tools. As soon as these are identified, AxEngine will stop the application from loading before any decryption ever takes place. In general terms, this is a “generic debugger scanner”. AxEngine attaches its own debugger to the application. As an application should normally only have one debugger attached, this is a very simple, but effective way of preventing debugging. Naturally, this method only works once per process space and should only be activated for the executable and not the runtime libraries.

A third mechanism is offered by static (with AxProtector during encryption) and dynamic (with AxProtector during loading) modifications to the executable. Common patterns, like Windows API function calls, are recognized and modified. This is done in a way that makes it extremely labor intensive for automatic dumping and reverse engineering tools to reverse the process.

Most of these methods are implemented for Windows, which reflects the fact that most hacker tools are also used on Windows systems.

IxProtector for Dynamic Decryption in Runtime

IxProtector is the third layer of protection against memory dumps. You define individual functions that are kept in memory in encrypted form like other resources. You can use WupiDecryptCode and WupiEncryptCode to define yourself when which function would be encrypted and decrypted.

A memory dump would normally only produce a set of encrypted functions in this case. For a genuinely complete and executable hack, the hackers would have to decrypt all functions and piece the puzzle back together manually. By increasing the number of encrypted functions and decrypting them dynamically during runtime, you are effectively increasing the effort for the would-be attacker.

IxProtector is available for Windows, Linux x86/x64/ARM, and macOS.

Traps Preventing Static Analysis

Attackers might try to decrypt all functions manually before attempting a memory dump or after they have access to the dump.

They would need the right license for the functions they are trying to hack. As another unique feature of the CodeMeter universe, different licenses come with different keys. If individual functions are assigned to different licenses, they would also be encrypted with different keys. To crack them, the hackers would need the entire key set.

Even in the unlikely case that this ever happens, IxProtector has a fourth protection mechanism: traps that are set to prevent the systematic decrypting of all functions. You include certain functions in your software that are never called in normal operations. At the start of each function, a special lock code is introduced. If a hacker then randomly decrypts this function (while working his or her way through the entire set), the code locks the license and stops the decryption of the remaining functions until it is allowed again by the developer. This is an effective mechanism, especially for CmDongles.

Translocated Execution for Ultimate Protection

Translocated Execution is the fifth, ultimate layer of protection against memory dumps. In

addition to stronger security, Translocated Execution offers automatic features that make the integration of IxProtector simpler than ever.

Translocated Execution is an expansion of IxProtector. In contrast to the standard IxProtector, the functions are not decrypted and executed at their original location, but at a different place in memory. The same location is then used for several other functions, one after the other. This makes the process a confusing and complex puzzle for hackers, as it becomes dramatically more difficult to understand which piece goes where. It is a jigsaw puzzle whose pieces keep swapping places and changing form. On top of all this, the specific location where the decrypted code is handled is one that is ignored by most common dumping tools.

Two options are available for decryption:

1. Automatic decryption
2. and Manual decryption

When using automatic decryption, you do not have to worry about decrypting your functions. AxProtector automatically injects the required decryption code at the place of the original function. The function can also be kept in cache for a brief time before it is automatically cleared away. Without this optional caching, the function is immediately removed or overwritten once it has been executed.

For additional control or if the original function is too small, you can decrypt your functions manually with WupiDecryptCode and WupiEncryptCode and remove it from cache, as in the original IxProtector. You can choose the best option for your needs individually for each function.

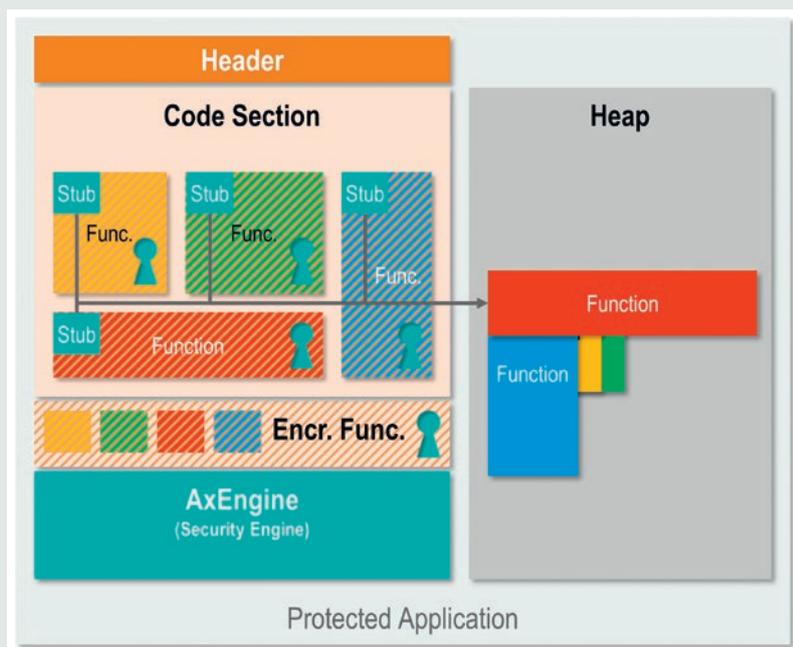
Translocated Execution is available for Windows, Linux x86/x64, and macOS.

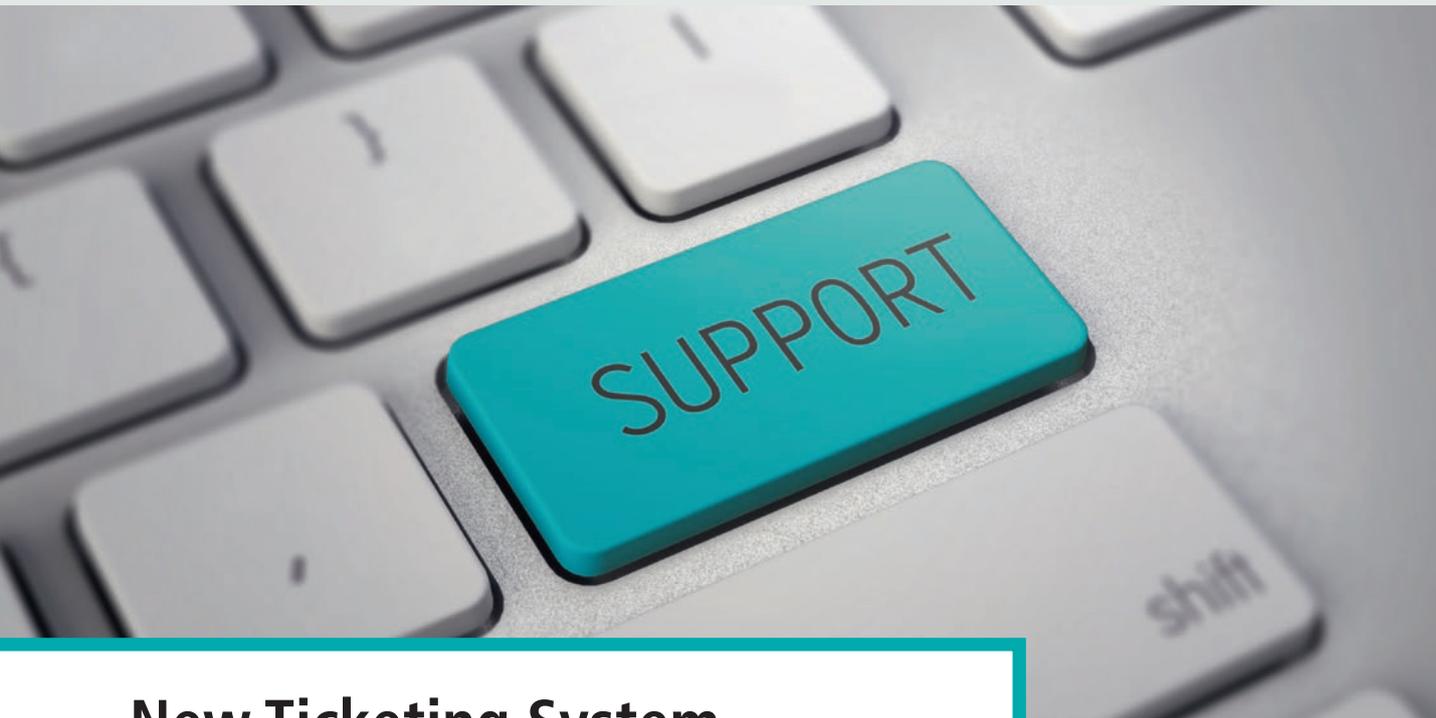
High Level Languages

For high level programming languages like .NET and Java, AxProtector .NET and AxProtector Java offer two specialized tools, designed for these specific use cases. The line between AxProtector and the methods of IxProtector is less sharply defined in this case. Methods, functions, and classes are decrypted dynamically during runtime, and traps can be set. In the case of .NET, the decryption happens automatically at a different location in the memory.

Conclusion

CodeMeter Protection Suite guards your software against memory dumps. IxProtector and Translocated Execution equips you with two powerful methods that are easy to integrate and add more layers of protection around your applications. 





New Ticketing System

The backbone of positive service management is an effective ticketing system that coordinates queries and questions, improves communication with the customer, helps optimize processes, and offers a user-friendly self-service portal.

The right choice of tool is of considerable importance. After a lengthy and thorough selection process, we decided in favor of a European provider who will be able to fulfill the requirements of our international business for the long-term future.

The Project

The new ticketing system has been up and running and received very positively by our partners and clients since the summer. The self-service portal is particularly popular as many tickets have already been registered via this channel since its launch.

Help Desk

The introduction of the ticketing system gives us time to revisit, scrutinize, and redesign our support processes. As a result, we have established a dedicated help desk that will take in new tickets, review, and allocate them to the right support staff or solve them immediately whenever possible.

Access

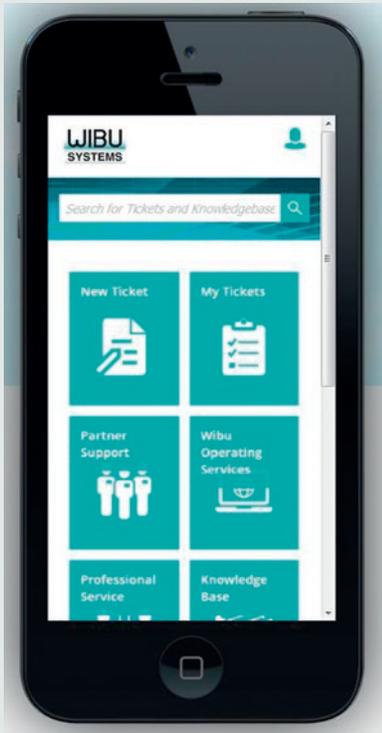
The self-service portal is available only for our customers, not their end users. An access hierarchy can be arranged on request. The standard procedure is that each customer can only access the tickets he or she has registered.



With the next higher permission level, that access can be expanded to a specific site or an entire organization – you can always contact us with your requirements!

Your users can still send in their own queries by email or phone.

The portal can be used via a standard Internet browser. It has also been optimized for display on mobile devices.



Features

Following are the key features of the new ticketing system. For more information, please consult our help pages via the self-service portal.

Support Process

Every ticket passes through a defined process, during which its status will change as follows:

- 0 – Registered. The ticket has been received, and the user is sent a confirmation.
- 1 – Qualified. The ticket has been processed by the helpdesk and assigned a level of priority.
- 2 – In Progress. The ticket has been taken over by a member of our support staff.
- 3 – Forwarded. The ticket has been forwarded to the relevant department.
- 4 – Waiting for Customer. The ticket is put on hold while the system waits for necessary information.
- 5 – Updated. The customer has changed the ticket.

- 6 – Waiting for 3rd Line. The support team waits for feedback from a specific department.
- 7 – Waiting for RfC. A Request for Change has been registered. The system reports whether this has been accepted or rejected.
- 8 – Solved. The solution has been provided by our support team.
- 9 – Closed. The ticket is closed after the solution has been confirmed or no more feedback has been received.

The customer is notified by email whenever the ticket changes its status.

Service Level Agreements (SLA)

SLAs are stored in the system and will be applied automatically when processing a ticket. We are committed to meeting all deadlines and will constantly monitor and optimize our services with this in mind.

Public Messages

The portal can publish messages for the user base. It can notify clients immediately of any major disruptions in the service and inform them about any actions that they could or should take.

Knowledge Base

The knowledge base is primarily a repository of troubleshooting and installation guidelines, although more content will be added over time. Whenever you book a ticket via the self-service portal, you will be given a selection of articles that fit your query. You can help us improve our services for you by rating the quality of the articles.

Self-Service Portal

You can use the portal for the following purposes:

- Registering new tickets with automatic solutions from our knowledge base.
- Uploading files.
- Recording a reference number, e.g. from your own ticketing system, and a priority to match the defect type.
- Checking the ticket status and editing active tickets.
- Checking the expiry date, i.e. the time stamp for the processing of the ticket as defined by the SLA, or the expected time to a solution.
- Full search through all tickets and our knowledge base.
- Accessing the entire ticket history, including any attachments.
- Rating the service quality.
- Managing your personal profile.
- Accessing online help.
- Other special features on request.

Looking Ahead

By the end of the year, additional Wibu-Systems sites will be included in the new ticketing system. 

ComDust Result Log

T-101641

TU **Traschuetz, Uwe**
 Logged on August 22, 2017
 Error text / error code which occurs and Description of the problem
 - How can I generate the log files?
 Reference Number
 - #123/45/697

TU **Traschuetz, Uwe** August 22, 2017 1:52 PM
 @ Original request.pdf

Balogh, Jannik August 22, 2017 1:58 PM
 Please check our knowledge-base

Add reply

Processing
by Balogh, Jannik

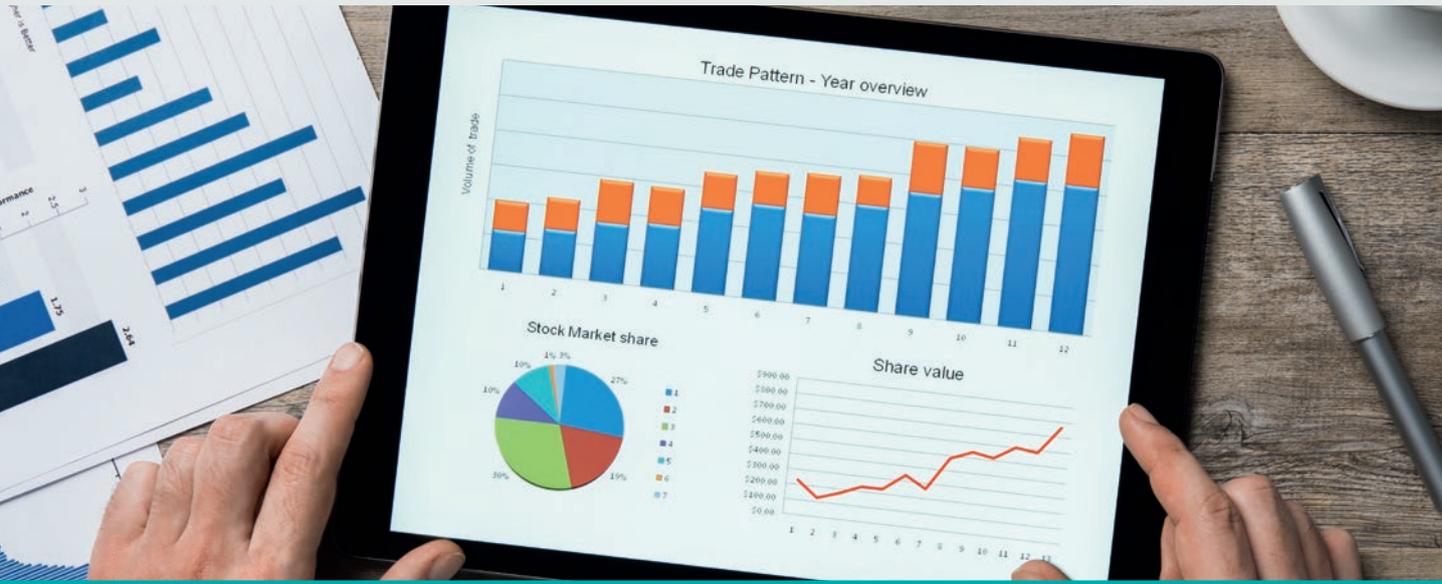
Due date
August 25, 2017 1:52 PM

Status
2 - In Progress

Type
Incident

Categorization
CodeMeter - Handling

Impact, Urgency, Priority
2 - Severe, 2 - Severe, Prio 3



New Business Models for Software, Machines, and Materials

In the past, the software industry relied on the simple one-off sale of software. This had specific drawbacks for both the software developer and the user buying it. The seller had no dependable income beyond the incidental sales, and the user had to fund a major upfront investment. Software developers could create more reliable revenue streams with maintenance and support agreements, but would then have to offer substantial discounts to counter the impact of high original purchase prices – and discounts are not the most popular approach for the people forced to offer them.

Pay-Per-Use for Machines

This business model is very similar for machine makers. Again, the upfront costs are usually very high. Maintenance agreements or service fees are an appealing after-sales revenue stream that helps pay for new product developments. On top of software, the sale of spare parts and consumables is another source of income, be it the cutting of the basic material used for dental implants, for example, or more straightforward printer ink, toner, or 3D-printing granulate. Frequently, the makers of the machines also sell these consumables, which creates interesting avenues for other business models – for instance, giving the users a pay-per-use option that lets them pay only for what they are actually using. In the short term, this means lower investments and lower risks from purchasing the machines. In the long run, the machine maker has a reliable income stream, at least if the user remains a satisfied client.

Pay-Per-Use for Software Only

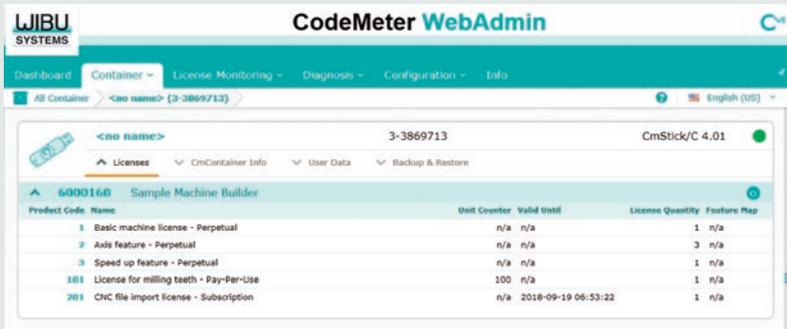
One might think that pay-per-use is only an option for machines or consumables. This could not be further from the truth, as the concept also works for software-only solutions. Imagine software that calibrates pumps. Your business model might then be based on having the user pay for each calibration. In practice, this would mean creating software licenses, like CodeMeter does. You charge a fee per license, which CodeMeter has been doing reliably for almost 15 years. And this is only one of many already successful pay-per-use models.

You could also bill your users for the time they spend using your software. The approach chosen for several years by CivilServe GmbH, Germany, when addressing international markets is very interesting in this respect: Their users can buy contingents of 10 hours of use time for their entire construction software portfolio. This is a very enticing option for clients that need different components of

the software, but only for a temporary period on one project. For the developer, it is also a promising choice, as it creates a relationship with clients who might eventually buy the full package.

Maintenance Agreements and Subscriptions

Classic choices for software include support or maintenance agreements and subscription models. They are technically closely related to the pay-per-use models. The end of the update period or usage period is set in the software license, and a process would be started automatically to renew the license. The difference when compared with pay-per-use licenses is that this renewal is a cyclical event and does not consider the actual use of the software or machine. Models and procedures of this type have been described in more detail in other issues of our KEYnote.



Technical Implementation

One of the great benefits of CodeMeter is the fact that it has been offering pay-per-use capabilities for many years already and also accommodates offline use. All licenses, be they dongle-based, computer-based, server or cloud licenses, come with a license option for a pay-per-use counter. This unit counter is set to a starting value by you and then begins to count down. You can read the counter automatically and reset or increase it at will, by an absolute figure or by a relative count. This represents the technical underpinnings for any pay-per-use implementation.

With these foundations in place, you can establish both prepaid and consumption-driven models. Prepaid models would start with the unit counter set to a specific value, which is counted down in response to a specific action. That action is prohibited as soon as the counter reaches 0. Consumption models set the unit counter to its maximum value of 4 billion (0xFF FF FF FF). The countdown begins, and the difference to the maximum value shows you the number of the actual consumed units.

How the unit counter counts down depends on your chosen business model. If you license your products by usage time, the unit counter would, for example, count down by the minute. The total time is recorded as a value in minutes in the license. Of course, you can also set the interval to 5 or 10 minutes. In these cases, you can leave the count down up to AxProtector; a manual implementation is not necessary.

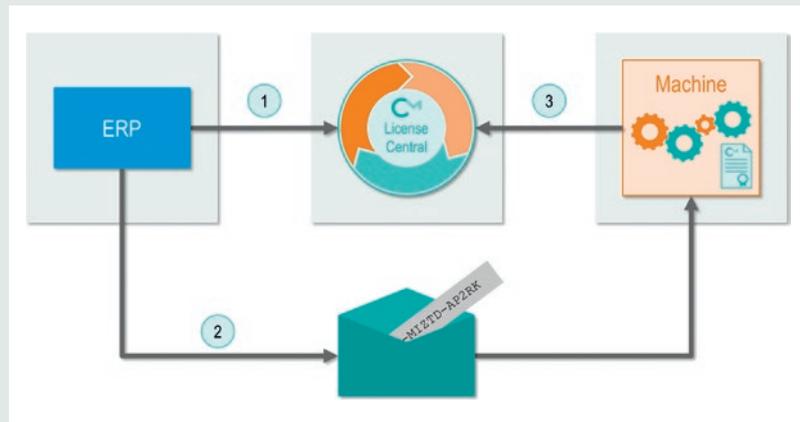
If you want the counter to work by numbers of processed dental implants, by printed objects, or by device calibrations, for example, you include this in the API at the right place in your application. This can be done securely by setting the counter to count down first before the actual action is allowed. Naturally, the counter can also be set to count down after the fact. You can also set the counter to deduct

different values for different operations, e.g. two units for a canine implant, but three for a molar.

Only Proprietary Material

One common requirement for pay-per-use models is that the machine user is given discounted access to the machine, but only allowed to process material on it that was supplied by the manufacturer.

The most pragmatic way of doing so is a combination of a pay-per-use counter with a defined amount of material. Your user is



allotted x pieces of material and y units. Every time one piece is processed, the counter goes down by one unit. This means that the user can only work with the amount of material he or she has actually purchased. It would, of course, be feasible to use the same units to process "cheap" material from the "grey" market, but the limit on the actual units makes this choice commercially pointless.

A technically better way is to mark the materials and include means to authenticate the marker in the machine. If the material in question is, for instance, delivered in a cartridge with its own intelligent computing capabilities, a challenge-response technique

with asymmetric encryption would be a safe tactic. This is, however, not possible for simple materials like paper or granulates.

The most sophisticated option would be to define one license per delivery / packaging unit. The license could be tied to specific properties, like a watermark in the material, which would be scanned and checked against the license. It could also be a special property like the typical shrinkage of the implanting block when heat-treating a dental implant.

Creating a Pay-per-Use License

The process of creating and delivering a pay-per-use license does not differ from the creation of any other regular license or a subscription or maintenance agreement license. In most cases, the procedure is initiated by an ERP, e-commerce, or CRM solution, which sends the order with the right material number to CodeMeter License Central, where a ticket is created (with an activation code, product number etc.) and returned. You can decide how the user receives the ticket, e.g. as a PIN letter, a license card, or – the fastest and easiest option – by email.

The user can then transfer the license or the units he has purchased onto a local CmDongle, a CmActLicense bound to a given computer, a license server, or a Cloud server. From that point, he or she has access to the license and free units. Typically, that transfer process is integrated in the licensed software (leaving the user to only enter the ticket) or handled via a simple license portal.

There are two options for integrating the interface for creating licenses. Either, you create separate packages with e.g. 10, 100, and 1000 units. Or you create an article and leave the unit counter as a dynamic value. Your choice will depend on the capabilities of your ERP, e-commerce, or CRM solution.

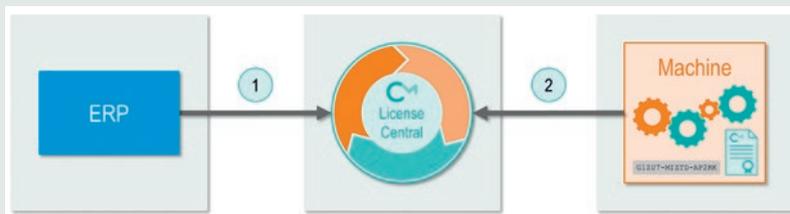
Buying New Prepaid Units

With subscriptions or maintenance agreements, the renewal date is known and pre-defined. In the case of pay-per-use licenses, the renewal depends on the actual units consumed by the client.

This is simple when material is licensed for a machine: A ticket is created for each delivery or a license booked onto an existing ticket assigned to the machine in question. If automatic renewal is configured, the ticket can be stored in the machine and new units retrieved with full transparency for the user. In the rare cases that the machine might not be online, the license can be delivered by a separate file, automatically including all of the security features and protection mechanisms of CodeMeter. The license file can be used only once on the target machine. Any open updates are automatically included, and the process is completed with a transparent receipt.



delivered either as a new ticket or loaded onto an existing ticket in a given machine.



To buy new units manually, the user starts an order and typically receives the new units immediately after the purchase has been completed, if an e-commerce solution is used. For ERP or CRM solutions, the delivery time will depend on the specific system, its implementation, and the defined processes. Your software notifies the user if the unit counter is reaching its limit, so he or she can purchase new units in time.

Automatic Billing

Automatic billing needs communication to flow in both directions to ensure that the current unit counter is fed back to you without tampering or manipulation. CodeMeter has a built-in function to export such data; how you process it in your ERP, e-commerce, or CRM systems depends on the workflows you have defined for your business. Which means of payment are allowed for which clients? What happens when a credit card expires? How are clients locked out if they fail to make their payments?

After the billing process has been completed, CodeMeter License Central is instructed to create a new license or free up new units. Just as in the case of manual orders, these are

Opportunities and Threats

Introducing pay-per-use models offers many long-term benefits, but also entails certain risks in the short term. There is an initial drop-off in revenue as clients pay less upfront. In practice, the new model is ideally introduced in a new market segment or for a new product. This prevents the new revenue source poaching from existing processes, and it enables you to test the waters and see whether the new model is accepted by your clients without putting your business at undue risk.

Should you allow your clients to choose between traditional licenses and pay-per-use licenses? The answer is: It depends, on your target group. Typically, such flexibility will only pay off if it attracts substantially more new clients.

Conclusion

CodeMeter offers licenses with unit counters and automated processes in CodeMeter License Central for an optimal solution that makes pay-per-use models just as simple to handle as permanent or subscription licenses. At the same time, you are free to choose your favorite secure element for storing the licenses: CmDongle, CmActLicense, server in the LAN or in the Cloud. The processes to create or renew licenses are easily integrated or automated. Switching between license models is always possible by creating the right license. Whatever your needs, CodeMeter gives you complete flexibility without compromising your control over your licensing models. 

Allowing Third-Party Material

Because of something as strict as anti-trust legislation or as straightforward as your chosen business model, sometimes you may have to switch off pay-per-use or allow third-party material on your machines. This depends a lot on the specific commercial details of your agreements: If a machine is provided for a set contractual term, the legal or practical constraints might be different than if the actual ownership changes hands when the machine is sold.

Technically, both situations can easily be addressed by CodeMeter. A third-party license can let your machine decide whether third-party material can be processed on it. You simply sell this license at a price of your choosing (or even free of charge).

Switching off pay-per-use is also simple: CodeMeter treats a license without a unit counter as an unlimited license. It can be used as if it had an infinite number of units left. You simply create the right license and the restriction is eliminated; no change in your software is required.



CodeMeter Cloud Lite

For almost a decade, CodeMeter License Central has been Wibu-Systems' solution for cloud-based licensing. Licenses can be created in the Cloud and transferred online to a PC or other device. Users can take their licenses with them from device to device by deactivating and reactivating them. CodeMeter Cloud Lite now adds another option to our product portfolio.

Read more to find out how it differs from the established solutions and which use cases it was made for.

Strong User Focus

CodeMeter Cloud Lite is another server in the Cloud, which can be operated either by yourself or by Wibu-Systems. CodeMeter Cloud has the necessary interfaces to work seamlessly with existing SSO (Single Sign On) solutions in your established IT landscape.

As is the case with all types of CodeMeter licenses, the licenses are created and delivered through CodeMeter License Central. This means that you do not have to change anything about the integration with your existing CRM solution. Instead of activating or transferring the license in a local CmContainer, it is simply allocated a User ID in CodeMeter Cloud Lite. That user can then use the license directly from CodeMeter Cloud Lite, irrespective of whether he or she is working with a SaaS application, an app on a mobile device, or a standard desktop program.

Standard Processes

CodeMeter Cloud Lite uses the standard processes of CodeMeter License Central. It gives you a new choice of container, CmCloudLiteContainer, letting you determine whether the license can only be used with CodeMeter Cloud Lite or also transferred to a local CmDongle or CmActLicense. In the latter case, the user has the freedom to choose where to move the license. The license can be retrieved for a new activation by deactivating the offline license or removing the account from CmCloudLite. The

user can switch from dongle to soft license to the Cloud, depending on what you allow.

No CodeMeter Runtime

CodeMeter Cloud Lite offers a SOAP and a REST interface, making CodeMeter Cloud Lite available even on systems where no CodeMeter Runtime is available or integration with CodeMeter Runtime or CodeMeter Embedded is currently not feasible or excessively difficult. This applies primarily to HTML5 applications with JavaScript or PHP applications on servers.

Perfect for Server and SaaS Applications

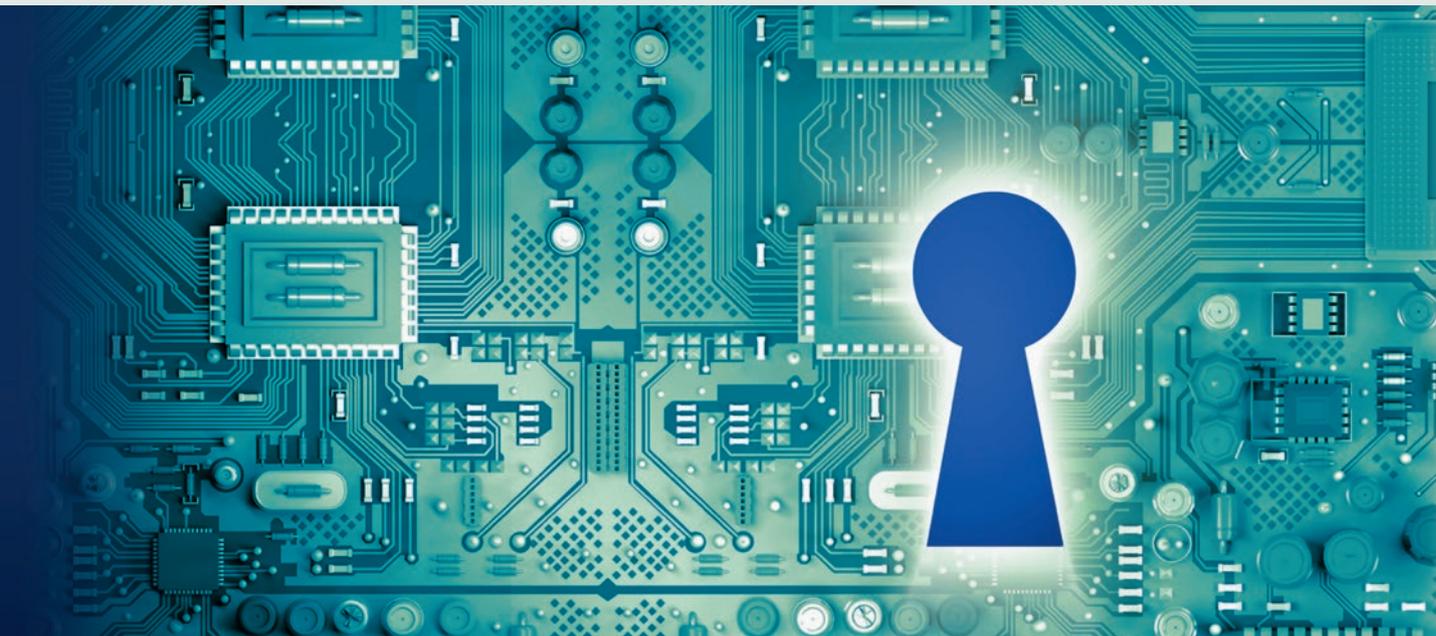
CodeMeter Cloud Lite truly comes into its own with server and SaaS applications. Consider this scenario: The user logs in to a SaaS application, which in turn checks with CodeMeter Cloud Lite for available licenses and unlocks the licensed features. Now, you might be wondering whether this could be done much more easily with a simple permission table. It can, but the great advantage of CodeMeter Cloud Lite is the uniformity of the processes in the Cloud and on the local premises. CodeMeter License Central can be integrated with SAP, Salesforce or other ERP, CRM, or e-commerce solutions easily, and the process for creating licenses already exists in CodeMeter Cloud Lite.

Mobile applications for tablet computers or smartphones can also be used with CodeMeter Cloud Lite licenses, either by direct

integration in the app or by relying on the server. Local applications can be protected against tampering and reverse engineering with this license technology by using CodeMeter Protection Suite and a Protection Only License.

No Need to Return Licenses

Traditional solutions need users to actively return a license. With CodeMeter Cloud Lite, the user can use the license again without any specific action on his or her part, even on a new device. You determine a timeframe for the license' period of allocation; a keep-alive option extends that period automatically from within the active application. When that time has expired or the license has explicitly been cleared, it is available again for your user. Multiple licenses make it possible for users to use their applications simultaneously on several devices. 



CodeMeter Embedded 2.0 - New Features

CodeMeter Embedded is entering its new generation, bringing with it several important and exciting innovations and giving the library a well-deserved version number – CmE 2.0

The internal architecture of the CodeMeter Embedded Library has been completely reworked and brought up to date. CodeMeter Embedded can now access the shared key storage with multiple processes at the same time. PC users might consider this a standard capability, but this feature had deliberately been left out of earlier embedded versions.

The code was meant to be kept to a minimum size, with no active services, and with the CodeMeter Embedded Library included directly as part of protected programs. For many implementations, such a single instance is still a viable option. However, increasingly powerful embedded systems allow a new feature set, with multiple programs or processes sharing access to a single CmContainer.

This opens up new possibilities for many oft-requested use cases that would have several program parts or CodeMeter-protected programs from different makers running simultaneously: the desktop world has come to the embedded world. The processes are coordinated in the background, but with full transparency for the user, and no service or daemon is required. This means that Code-

Meter Embedded 2.0 can still be integrated without much adjustment and upgrades from CodeMeter Embedded 1.x are directly possible. The internal design changes are making the licensing system more flexible and capable. Our name for it is License Core.

Using the New UFC Firm Codes > 6,000,000

The move to the 2.x version also marks the beginning of license transfer capabilities for CodeMeter Embedded. Starting with version 2.0, users can employ existing UFC firm codes on their dongles, keeping the Firm and Product Codes compatible across the entire CodeMeter universe.

Work has already started on version 2.1, which will be able to update UFC licenses remotely. CodeMeter Embedded 2.1 with dongles can then also act as license transfer endpoints. The license transfer function for CmActLicenses will be included in version 2.2 and complete the transition to the new license transfer feature set.

A typical industrial use case would be a machine that is installed at the client and

commissioned by a technician. The license required for a CodeMeter-protected sensor or PLC program can be brought along on a CodeMeter USB dongle and injected on site into the machine's controllers.

The same approach is used for replacement services. Machines of this nature are often connected to the Net, but usually not allowed to access external services like CodeMeter License Central for security reasons. License transfer makes it easier for users to transfer licenses without having to integrate the RaC/RaU handling on a mobile storage device.

CodeMeter ASIC with SPI Interface

The standard dongle functionality in CodeMeter Embedded is being expanded with another interface. On top of USB and SD bus interfaces, SPI is now another option. Designers of circuit boards can get the CodeMeter chip in ASIC format and integrate it directly into their layouts. The CmASIC itself comes with two integrated interfaces: USB and SPI.

The USB specifications include the hardware interface and a protocol stack to enable

connecting with the basic functions of most operating systems. Like the USB dongle, the ASIC functions either as a mass storage device (MSD Mode) or a keyboard (HID Mode).

The latter ability is a viable choice for more restrictively hardened environments that disallow flash memory access to prevent accidental malware infections. The new SPI interface represents a low-level hardware interface, which bypasses the USB stack to save power and connect directly with the chip. SPI enables the ASIC to be used with custom implementations, not the least in very lean systems without USB stacks or bare-metal implementations without actual operating systems. The required communication protocol comes integrated in CodeMeter Embedded 2.0 and needs no more adjustments on the part of the client. The SPI function in CodeMeter Embedded Library uses the SPI kernel driver to communicate with CodeMeter ASIC.

What Else Is New?

The version numbering for CodeMeter Embedded now follows the standard conven-

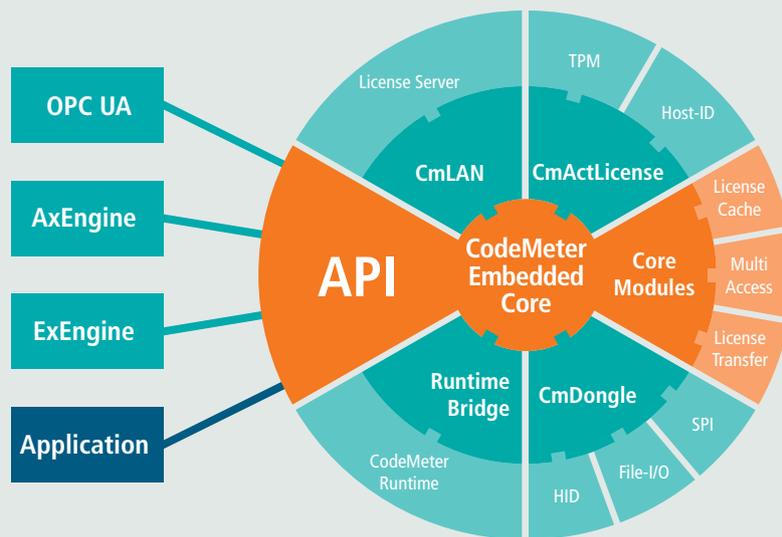
tions for our other products, like CodeMeter License Central or AxProtector. The build number ceases to be part of the version. Instead, we will distinguish between major and minor releases with an alphanumeric count. This makes the new version of CodeMeter Embedded 2.0b.

CodeMeter Embedded 2.0 also includes more powerful processors like ARMv8 with 64-bit operating systems such as Linux and Windows.

CodeMeter Embedded will not be offered only as an off-the-shelf product. Many features are now modular. In order to keep the software as compact as possible. Only what is needed will be delivered. Depending on the configuration and platform, the library will change in size in a range of a few hundred kilobytes. This flexibility means that the target system and use case will now be considered and custom packages prepared for each new client. CodeMeter Embedded can now be scaled to match the client's specific needs. We are testing possible combinations for different versions of common operating systems on



different platforms (cf. the attached table). This covers most use cases in the real world. For more specialized needs, the client can compile the source code with the required tool chain himself and adapt it for real-time operating systems or other custom implementations. 



Tested Combinations:

- Linux x86 and x86_64
- Linux ARMv6hf (RaspberryPi 2)
- Linux ARMv6 (RaspberryPi 2, Pandaboard)
- Linux ARMv7hf (NanoPi, RaspberryPi 3, Cubietruck, BeagleBoneBlack)
- Linux AARCH ARMv8hf (ODROID-C2)
- QNX ARM (Pandaboard)
- QNX x86 (Intel Desktop Board D525MW)
- VxWorks 6.9 PPC (P2020), x86 (NITX315), ARMv7 (SabreLite IMX6Q)
- VxWorks 7 PPC (P2020), x86 (NITX315), ARMv7 (SabreLite IMX6Q), 64 (DELL Optiplex)
- Windows x86 and x86_64
- Android 5.1 (Raspi3)

News in Brief

CmStick/BMC 16GB

An eye-catching, compact full-metal body that packs a punch: An industrial hyperstone U9 flash memory controller with hmap® firmware, 2 Bit MLC flash memory, USB 3.0, and a CodeMeter smart card chip.



CmCards

A unique combination of industrial flash memory with a CodeMeter smart card chip for use in medical devices, PLCs, IPCs, and IoT gateways for top reliability.



CmASICs at Kontron

Kontron produces all of its new CPU modules and boards "IoT-ready" with integrated CmASIC, thus reducing space and power consumption features to the minimum, supplying SPI and USB interfaces, providing licenses for novel business models, and featuring unparalleled hardware security.



CodeMeter wins the 2017 CODiE Award

CodeMeter was nominated as a finalist in two CODiE categories and named the "Best Content Rights and Entitlement Solution"!

//CODiE//
2017 SIIA CODiE WINNER

Wibu-Systems becomes a Dell IoT Associate Technology Solution Partner



IoT Solutions
Partner

CodeMeter has been qualified for the Dell Edge Gateway 5000 Series and Embedded Box PC 3000 and 5000 Series.

Winner of the Customer Satisfaction Survey 2017

We thank all participants in our survey for helping us improve our products and services further. Mirco Schmedicke, Operations Manager at EyeC GmbH, Hamburg, Germany enjoys his reward, a €200 Amazon voucher: "That is great news for me. I had no idea there was a reward. I am sure that we will continue to do business together for a long time, so continuous improvements are important on both our sides."

Corporate Technology (CT)



Since March 2017, our new CT unit has been in charge of our corporate technology, architecture, and R&D projects, managed by Dr. Andreas Schaad (l.) with the support of Dr. Björn Grohmann (r.), Dr. Peer Wichmann, and Wolfgang Neifer.

Gold „Windows & Devices“

Gold

Microsoft Partner



Wibu-Systems has achieved Microsoft Partner Gold OEM competence. This and our other partner programs help us guarantee the optimal implementation of our technology.

Wibu-Systems at OSADL

The members of the Open Source Automation Development Lab eG are promoting RTLinux. We are part of the venture and will test CodeMeter regularly in the QA farm.

Platform Industrie 4.0

Wibu-Systems is contributing to working group 3, "Security of Interconnected Systems".

Joining Industrial Associations in Italy: Associazione Nazionale delle Imprese and Clusit



ASSINTEL
ASSOCIAZIONE NAZIONALE
IMPRESE ICT



We are increasing our presence in Italy with active membership in the country's ICT associations.

New Distributor in South Africa: CodeLock



CODELOCK

Professional services, support, and a local warehouse will help us serve our clients better in South Africa and the neighboring countries.

Cooperating with Tongji University of Shanghai



中德工程学院
CHINA GERMAN UNIVERSITY
OF APPLIED SCIENCE



The first step in our cooperation with the Sino-German University of Applied Science and the "Industrie 4.0 Smart Factory Labor" is a training course with hands-on workshops on licensing, protection, and security, set to start in late September 2017 at the renowned Tongji University.

Case Study AGFA HealthCare



The Challenge

Agfa HealthCare's Easy Payment Scheme for Computed Radiography (CR) offers a complete setup for digital imaging – including equipment and software – without any upfront investment. The challenge for the company was to keep bottom line costs under control by delivering the same apparatus to a very diverse customer base and still be flexible on the market with a granular offer that could be fine-tuned to meet feature and affordability demands.

The Solution

Wibu-Systems' CodeMeter technology proved to be the fitting solution for Agfa HealthCare's proprietary operating system, as it couples software protection measures for a multitude of platforms with versatile license-based entitlement management. An entire array of scalable license models is ready-made, including time-based licensing, which is widely acknowledged to highly impact software revenue recognition.

The Result

The cutting edge cryptographic methods included in CodeMeter protect the intellectual property of Agfa HealthCare's Easy Payment Scheme for Computed Radiography. Agfa HealthCare can therefore deliver its system fully encrypted and be sure to preserve its integrity. Additionally, the easy-to-use license lifecycle management system of Wibu-Systems facilitates end users' access to the most sophisticated CR technology.



The Company

Agfa HealthCare is a leading provider of diagnostic imaging and healthcare IT solutions for hospitals and care centers around the world. The business group is a major player on the diagnostic imaging market, providing analog and digital technology, as well as IT solutions to meet the needs of specialized clinicians. The business group is also a key provider on the healthcare information solutions market, integrating the administrative, financial and clinical workflows of individual hospitals and hospital groups.



Samith Kakkadan Imaging Product Manager, Agfa HealthCare India

"Wibu-Systems protects our Easy Payment Scheme for Computed Radiography. The secure entitlement system is key for our users getting direct access to our technology regardless of their financial resources. In particular, time-based licensing allows our users to pay according to a preset time scheme that we have configured. At the same time, it guarantees our return on investment in CodeMeter."

Louis Kuitenbrouwer VP Imaging, Agfa HealthCare

"The low-end market for Computed Radiography is growing quickly. Smaller hospitals, private practices, and cost-conscious radiology facilities want to go from analog to digital. Agfa HealthCare's Easy Payment Scheme, powered by Wibu-Systems' versatile license lifecycle management, provides digital imaging at an affordable and predictable price."

Wibu-Systems Workshops

Wibu-Systems offers you the opportunity to participate in one of the special seminars about:

- Software Monetization, Back office integration
- Licensing of software, with hardware or software-based keys (SmartBind)
- Code protection against illegal use & reverse engineering
- Solutions for embedded software in systems or cloud applications



Access the latest training schedule by scanning the QR Code or visit www.wibu.com/tr.

Training location	Date	Time
Barcelona (ES)	4 October	10 am - 3 pm
Paris (FR)	12 October	10 am - 3 pm
London (UK)	2 November	10 am - 3 pm
Brussels (BE)	8 November	10 am - 3 pm
The Hague (NL)	21 November	10 am - 3 pm

Contact your local sales representative for details about the workshops and/or upgrading your test kit or current solution to Universal Firm Code with secure offline license transfer and borrowing.

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France	+33 (0)186266129	sales@wibu.fr

Join Wibu-Systems and its subsidiaries at the following events:



ASD DAYS
11-12 October 2017
Paris, France



D&E EVENT
12 October 2017
Den Bosch, The Netherlands



IoT – from Sensors up to the Cloud
19 October 2017
Novotel Messe, Munich, Germany



EKON 21
23-25 October 2017
Hilton Hotel, Cologne, Germany



heise devSec
24-26 October 2017
Print Media Academy, Heidelberg, Germany



Digital Transformation Convention
24-25 October 2017
Coal Bunker, Munich, Germany



ADVANCED ENGINEERING 2017
1 November
Birmingham, UK



IT Security in Industrial Plants
6-7 November 2017
Radisson Blu Hotel, Ettlingen, Germany



Embedded Conference Scandinavia
7-8 November 2017
Kistamässan, Stockholm, Sweden – **Booth 34**



W-Jax
7-9 November 2017
Westin Grand Hotel, Munich, Germany



Medica
13-16 November 2017
Fairground Dusseldorf, Germany



Compamed
13-16 November 2017
Fairground Dusseldorf, Germany - **Booth 8AN35**



SPS IPC Drives
28-30 November 2017
Messe Nurnemberg, Germany – **H7 - Booth 660**

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SECURITY
LICENSING
PERFECTION IN PROTECTION

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