Project Structure Document

Course material for the practical course
Computer Games Laboratory

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I15 Institute for Computer Graphics, Visualization, and Games Engineering

Contents

Overview

This term you will undertake a group project to design and build a prototype video game. The game design should be connected to the course theme introduced during the kick-off meeting. Since the course focuses on game technology, your game should also highlight at least one specific technical item from the field of computer science as your technical achievement (e.g., crowd simulation, procedural modeling, sound simulation, character animation, artificial life, etc.). You're welcome to include more, but keep in mind that it's much better to do one thing very well than to do two things only half-way.

Developing a game is not trivial! Good software engineering skills are crucial. We're adopting a project structure based on six phases which are outlined in this document. The purpose of these phases is to assist you in planning and developing your game as well as prioritizing your time.

In addition to the software you will develop, each team will also generate a detailed project notebook that tracks the entire development process. With each phase of project development, corresponding chapters will be added to the project notebook. Early chapters will include your formal game proposal and a game prototype, while later in the course you will add updates for your intermediate and alpha release implementation. The final chapters will contain playtesting where your game is analyzed with the help of playtesters, and a conclusion where you can summarize your experience throughout the class and comment on what worked well and where you had problems. Although the project notebook will be a detailed document, you'll add to it throughout the semester so that the writing burden at any time should be manageable.

We're using a wiki system to help you with managing the project, where each team will create a separate page. This page will be used to organize thoughts about the project and post progress reports, demos, and other deliverables. It also gives you the opportunity to collaborate with other team members, due to the communal nature of the wiki software. Please create a wiki page for your team before the first milestone. You can take inspiration on how your wiki page could look like from the previous courses instances posted on the course website. Unless noted otherwise, the deadline for deliverable uploads for each milestone on the wiki is the day before the milestone at 23:59.

During every meeting you will have a chance to present the latest state of your game project. Unless noted otherwise, these presentations have a maximum total duration of 15 minutes. They should involve a set of slides to explain your progress since the last meeting, and typically also a live demo of your game. How you allocate the available time is up to you, but make sure that neither aspect falls short and that you stay on time! All team members should (more or less) equally participate in these presentations. Once all milestones are finished, the final games will be presented at the faculties Demo Day!

I Milestone 1: Formal Game Proposal

Recommended Reading: *Game Design Workshop: A Playcentric Approach to Creating Innovative Games, by Tracy Fullerton (Chapters 1-6). The book is available via the university library as an ebook that you can directly read online.*

1 Game Proposal Chapter

A formal game proposal makes up the first chapter of your project notebook. The game proposal describes your game idea, provides a detailed development schedule, and gives a qualitative assessment of your project. The proposal should be professionally prepared, expressive, grammatically sound, illustrative of your efforts and process, and easy to understand. A good design effort can easily be hampered by a poor communication of what was done. While the precise format of the report is up to you, you must include the following parts:

1. Game Description Describe your game idea in detail with at least 1500 words plus three pages of mocked-up screenshots, illustrations, pictures, and sketches. You don't need beautiful artwork at this point, just enough to bring the idea across. Your description should also highlight how your game relates to the course theme, and how individual design decisions can be justified in terms of the theme. You are free to interpret the theme from any angle, but major design choices shouldn't seem random but follow from the theme. Furthermore, this section should provide an overview of your game that sets the stage for the remainder of the project notebook. Describe any background or storyline associated with the game. Comment on the overall gameplay and the game genre that is targeted, as well as the core game mechanics and systems that are necessary to create this gameplay. Potentially, you can even include what methods, tools, and algorithms you are planning to use for the implementation of the game in the next milestones.

2. Technical Achievement As this is a TUM course and all of you are technical superstars, having a technical achievement is also a core part of the course. To this end, your game should include at least one core technical item. This is your chance to select a concept from another course or something that you have always been interested in, and to implement it in the context of your game. Try to impress us, while still ensuring that the concepts you target fit within the scope of the course. This section should detail the core technical item you plan to include. You are free to present more than one idea, but remember that it's better to be very successful at one item than to try to include multiple and failing.

3. "Big Idea" Bullseye Supporting the two sections above, the "Big Idea" Bullseye is meant to highlight the primary, central, most important conceptual idea of your game, as well as the central, supporting, extra-special and impressive technical component. Your

entire team should agree upon and buy into these two concepts during the design phase so that everything that goes into the project is focused and aligned around a common and unified goal. It sounds a bit obvious, but it's a powerful tool and easily forgotten once you get to the actual implementation phases. Include and describe a big idea bullseye illustration in this section (you can design your own, custom bullseye graphic). The primary (inner circle, "core idea") and secondary (outer circle, "technical innovation") aspects should be clear, short, direct, and to the point.

4. Development Schedule The development schedule is crucial and should contain two basic parts. First, you must provide a layered development description of your game, that divides the development schedule into five categories based on how crucial each element is. Second, you must provide a timeline for the course including major milestones and deliverables, as well as detailed information about who is responsible for each task, when each task will be started, how many hours each task requires, etc. More information about the development schedule and the timeline are given below in Section 3.

5. Assessment Tell us what the main strength of the game will be. What part is going to be the most cool? Who might want to play this game? What do they do in the game? What virtual world should the system simulate? Basically, you are setting up a world view for your subsequent design. What criteria should be used to judge whether your design is a success or not?

2 Considerations for the Game Idea

Think Small Nowadays, AAA games involve budgets of millions of dollars for implementation and marketing, with hundreds of trained software engineers, designers, and artists working on them. Plus, many game titles build upon a large body of code developed by the company for previous titles or related merchandising. To be successful in this class, you need to design a project whose complexity fits the timeline of the course and the skills of your group. Thus, your game will most likely be much smaller than big commercial games you've played in the past, and more resemble smaller indie games that are created by a handful of people over shorter time periods.

Do One Thing Well To do well in this course, you should to do one thing well. Your game needs to really stand out in one way, but not all ways. Doing one aspect of it well will get you a better grade than doing a mediocre job on a lot of things. Your game might excel in the gorgeous graphics, a novel game mechanic, the clever puzzle design, or the well-tuned user interface. Make it really stand out in one way.

3 Considerations for the Development Schedule

> *"The best laid schemes o' Mice an' Men, gang aft agley."* –*Robert Burns* (If you don't already know this proverb, then check out the original poem.)

Plan in Layers You can't accurately anticipate how long each step in your project is going to take. Consequently, you need to make a detailed development schedule that is layered, to prioritize the different tasks. Follow this structure:

1. **Functional minimum:** Minimal items to make something that you might call a game. You'd be embarrassed if you only got this far, but at least it'd be something.
2. **Low target:** Your target for what you really want to get done; the least possible to feel sort-of OK about the result.
3. **Desirable target:** This is what you're aiming for, if things go reasonably well.
4. **High target:** It might be possible to get this much done, if all goes extremely well.
5. **Extras:** Stuff that you know you can't get done this semester, but you might add later if you decide your game is cool enough to keep working on after the class is over, just for fun.

Structure your development so that you complete each layer before going on to the next. Plan exactly what is entailed in each layer, and which team member is going to do each component. Include this layered description in your proposal.

Task List and Timeline Develop a list of tasks for each layer above as well as which team member is responsible for each task and how long the task will take. Create a timeline for the entire term and assign tasks to each week. Include the milestones in the timeline (i.e., when each phase should be finished) as well as deliverables (i.e., reports, demos, etc.) based on the milestone due dates (see timeline on the course website). Note that the task list should not only include programming and technical tasks but also creative tasks (e.g., brainstorm on game ideas) and assignments (e.g., write report, prepare presentation). Thus, the tasks during the first few weeks will likely involve finalizing your game ideas and preparing the project proposal and presentation. This timeline is very important. It will help you understand if the scope of your project is appropriate for the course. It's a good idea to keep it updated throughout the course by tracking both the expected number of hours to complete a task as well as the actual number of hours you spent on it. This will help you extrapolate your progress and react accordingly.

4 Game Idea Pitch Presentation

Please come to class prepared to give a pitch of your game idea with a maximum length of 10 minutes. Describe your game and how it relates to the course theme. Argue for what the main strength of your game will be (remember the bullseye). Discuss the technical achievement(s) your game will include. Be sure to make your presentation professional, visual, and clear.

5 Deliverables for this Milestone

- In class: Presentation of your game idea
  - Pitch your game idea by describing the essential design elements and backing up your descriptions with sketches, storyboards, and other visuals
  - Motivate the design decisions with respect to the game theme
  - Show your "Big Idea Bullseye" and discuss your technical achievements
  - 10 minutes or less in total
- On the wiki (due one day before the milestone):
  - Written report with Game Proposal Chapter, including task breakdown and development schedule
  - Game idea presentation slides

II Milestone 2: Game Prototype

Recommended Reading: *Game Design Workshop (Chapters 7-8)*

The next step of the project is to create a prototype for your game. But first, you should provide feedback for the game ideas of every other group, to help them with finalizing their game idea.

1 Mutual Project Critiques

After listening to the game idea pitch presentations, every student (not just every group) should write one brief critique for every other project. The purpose of the critique is to provide mutual feedback to your classmates for refining their game idea. At this early stage, feedback of this sort is especially useful and important. Thus, try to give thoughtful and practical comments. For each other group, you should at least answer these three questions:

1. What is your favorite aspect of the proposed game? Why? For this question, point out what you think is the coolest feature of the game, what makes it novel, or what aspect would make you most inclined to play it. Your thoughts on the coolest part of the game may differ from those of the game designers!

2. What is your least favorite aspect? Why? Which part of the proposed game seems to be the least fun? Is there something that might be dull or boring? Why might you get tired of playing the game or find it frustrating? Be candid, yet tactful and polite with your answer.

3. Which single change or addition would you suggest to most improve the game? Offer a helpful suggestion on how to make the game better. Maybe you have an idea on how to make the gameplay more fun. Or, perhaps your favorite feature could take on a more prominent role. You might offer a resolution to your least favorite aspect that would improve the game. Please make comments that are reasonable given the scope of the course.

Please post your answers to these questions on the wiki page of the corresponding group, using the comment function at the very bottom of the page. Number your answers 1., 2., and 3., for each group so that all critiques are in a consistent format. Only a few well posed sentences are required for each question. If you pay attention to the project presentations, we expect that it should take a short time to complete this assignment. Of course, if you prefer to give additional feedback beyond the questions listed here, you're more than welcome to do so.

2 Prototype

The key goal of this milestone is to develop a prototype of your game that distills out the core game play. The prototype should incorporate the game mechanics while providing only a crude approximation of other features. While this activity may seem cumbersome and difficult, it is hugely important since it forces you to think carefully about the most essential elements of your game idea. A complete and final game may be extremely complicated, but the core elements on which the gameplay is based are often very simple. In this exercise, you will isolate those core elements and demonstrate them to the class.

For this assignment you must build a physical prototype using paper, glue, and other real-life materials. The prototype should expose the core gameplay in a form that can actually be played. The prototype will model the game mechanics and provide a foundation on which to add additional functionality. By designating one team member as the "computer" and the other team members as the players, you should be able to play your game. Any confusion or difficulty that arises on the side of the computer or players is a strong hint that the core gameplay needs some modifications in order to capture a successful game.

3 Iteration on your Game Idea

The prototype and the mutual project critiques represent the first iterations in the iterative development cycle you are following for the course. Be sure to take advantage of it! Play your game prototype and use the experience to improve your game's mechanics. Carefully read the feedback from the other students, and consider if and how you want to adjust your initial game idea to create a better game.

Highlight all changes to your game idea, design and planned schedule resulting from the prototype and the mutual feedback in this chapter of the project notebook. At this early stage, it is still easy to make broad adjustments to your idea. Even if radical changes from your initial game idea are necessary, it is no problem as long as your updated design still matches the scope of the course and the considerations in Milestone 1. Once you start coding, modifications will become increasingly difficult and costly. Try to converge on the core aspects of your game design now to avoid any missteps that could throw off your development schedule in the upcoming weeks.

4 Prototype Notebook Chapter

- Include sketches and photos of your prototype in such a way that you can demonstrate in the report how the prototype works and how the gameplay is modeled.
- Report on your experience playing the game. Was it fun?
- Explain what you have learned from creating the prototype. What has proved to be harder (or easier) than expected? What design revisions have you made to your game (idea) based on the prototype?

- Reflect on the critiques from other students. Categorize and mention a small selection of suggestions that recurred or that you consider important.
- What changes to your game idea have you made based on this feedback? Which suggestions did you specifically not include in your updated game idea and why?

5 Prototype Presentation

You've thought about your game idea, revised it, prototyped it, played it, and iterated on the design. Now is your chance to wow us with a demonstration of your physical prototype and an updated pitch of your idea in maximum 15 minutes!

- Tell us about your prototyping approach, and the resulting physical prototype. Explain how the prototype is related to your core game mechanics (or at least some key features). Comment on your playing experience, did the prototype already make for a fun, playable game?
- Demonstrate the gameplay of your prototype. You can do that via a live demonstration i.e. by bringing your physical prototype and playing it directly in class, via a video that you recorded while playing the prototype beforehand, or via detailed pictures that document the actions of each player during a playthrough step by step.
- Briefly discuss the most important feedback you got from other students.
- You should have worked out any rough issues of your initial game idea via the iterations, so you should have a clear and compelling updated game idea now. Outline all changes to your initial idea that were necessary due to your insights from the prototype and the mutual feedback.

6 Deliverables for this Milestone

- On the wiki **(due 3 days after the Milestone 1!)**:
  - Mutual critiques for all other groups as a wiki post (every team member posts individually)
- In class: Presentation of your prototype
  - Explanation of the prototype
  - Gameplay demonstration of your prototype (live play, video, or detailed pictures)
  - Changes to your game idea from the prototype and mutual feedback
  - 15 minutes or less in total
- On the wiki (due one day before the milestone):
  - Written report with Prototype Chapter, including updates to initial game idea
  - Prototype presentation slides

III Milestone 3: Interim Report

Each group should add a progress report chapter of about 1500 – 2500 words to their project notebook. Describe how many layers you have finished. You can include screenshots and images to help explain your game so far, and text to describe how a user would interact with it. Ideally, you have completely finished Layer 2 (your low target) and are well into Layer 3 (your desired target) at this point. You can consider to post small weekly progress updates on the wiki during all implementation phases, to keep others informed and yourself organized. If you do that, this report chapter should be extra easy since your weekly wiki updates will already summarize what you have completed. But it is also possible to only jointly summarize all progress for the end of each milestone.

Explain what has proved to be harder (or easier) than expected. What design revisions have you made to your game as a result of what you've learned during the implementation? These should be smaller than design changes made during prototyping! Discuss the implementation challenges you faced. Were there aspects that you wanted to build but were unable to do so?

In class, be prepared to give a live demo of your game so far running on your target hardware. Show us the latest and greatest of what you have! The demo should mostly focus on actual working code. You may also want to use slides to supplement the demo and give more insight into your progress and any issues you would like to discuss.

1 Deliverables for this Milestone

- In class: Interim demo presentation
  - Show the current state of your game
  - Discuss progress, your targets and problems/solutions that arose so far
  - Give a live demo of the working parts
  - As always, 15 minutes or less in total (including the demo)
- On the wiki (due one day before the milestone):
  - Written report with Interim Results Chapter, including a progress overview with respect to your project plan
  - Interim demo slides

IV Milestone 4: Alpha Release

Recommended Reading: *Game Design Workshop (Chapter 11)*

At this point, you're almost done! "Alpha Release" is intended to allow you to freeze a version of your game that is suitable for playtesting. You will start real playtesting immediately after this date. For the Alpha Release, principal design is long complete. Principal coding is also complete. Ideally, you will have met the goals outlined in Layer 3 (your desired target) and possibly part or all of Layer 4 (your high target).

In the following week you will put your game in front of playtesters and learn what they like and don't like. During playtesting you are only allowed to explain your game after the testing sessions. This means testers will know nothing about your game while they play. So make sure it is accessible, the controls are clear and the game's goal are clear only from the game itself. It is highly recommended to add at least some form of tutorial to your game (e.g. a tutorial level, an info screen for controls, small hint popups etc.) as even players without any previous experience with video games might come along as playtesters!

For the alpha release, add a chapter to your project notebook which follows the same guidelines as the interim report chapter for Milestone 3 above. Also, be prepared to give a demo in class on your target hardware. You should show that your game is playable. Comment on how far you have progressed and show us what is exciting about your game. Remember, your goal from the beginning is to make a game that does one thing very well. Now it's time to show us!

1 Deliverables for this Milestone

- In class: Alpha release presentation
  - Show the current state of your game
  - Again, explain your progress, challenges, solutions and changes
  - Give a live demo of your fully playable game
  - 15 minutes or less in total (including the demo)
- On the wiki (due one day before the milestone):
  - Written report with Alpha Release Chapter, including a progress overview with respect to your project plan
  - Alpha release slides

V Milestone 5: Playtesting

Recommended Reading: *Game Design Workshop (Chapters 9-10)*

Playtesting is arguably one of the most important aspects of game development. It is a continuous process that should take place throughout the development cycle. In an informal way, you have been playtesting your game every time you played it and made changes based on your experiences. In this assignment, we address playtesting in a more formal setting. To prepare for this assignment, please review the slides from the playtesting lecture (posted on the course website) and be sure to read the chapter on playtesting from the Game Design Workshop book.

For this assignment each group must perform a playtesting session with a minimum of five participants who are not in this class. However, having more testers than that can help as you will recieve more and more diverse feedback. Feel free to use any friends or family, although the more disconnected from you the better. Consider people you know from other classes, from sports teams, from clubs, etc. Ask gamers and non-gamers. Maybe there's a special person who you've been wishing you had an excuse to call. Now you have an excuse!

The exact format of the playtesting session is up to you and should be tailored to your game and to the type of feedback that is most appropriate. Decide whether you prefer to conduct each playtesting session individually or have all of the testers play together. Depending on your game it can also be possible to have a playtesting session via a video call, where the testers share their screen so you can observe and talk with them while they play. In either case, follow the guidelines in the slides and book:

- Welcome and thank them.
- Remind them that you're testing the game, not their skills.
- Request that they talk out loud throughout and ask questions even though you won't be able to answer.
- Afterward, interview them and discuss their experience.
- Don't ask questions that presuppose or suggest a particular answer.
- Offer beverages and snacks, or some token thank-you gift!

You shouldn't explain the game in detail or give information about your vision. Instead, just let them start playing, while you observe quietly and carefully. Take notes on what they do, on any mistakes or troubles they might have, and on your thoughts and impressions of their experience. If they don't think out loud, you can elicit information by asking questions like, "Why did you go there?" or "What were you thinking when you did that?". Don't answer their questions or provide help unless they are really stuck and cannot continue without intervention.

Afterwards, interview them about their experience. Prepare ahead of time with a series of questions. You can ask them the questions more formally or simply select questions on-the-fly to keep the conversation going. The slides and book chapter have many sample questions which you can take inspiration from.

1 Playtesting Notebook Chapter

In this chapter, describe the results from your playtesting assignment. Describe who you recruited for playtesting and how you organized the playtesting sessions. If possible, include some photos. List the questions you chose to ask the testers. Organize and summarize their answers. Comment on overall trends you learned from the exercise, as well as any specific suggestions that were particularly useful. Finally, describe any changes you made to your game based on the playtesting. Also included aspects that you would like change but likely won't have enough time for before the final milestone. In addition to the Extras in your layered development plan, noting down such changes can be a great starting point if you decide to continue working on your game after the course is over.

2 Playtesting Presentation

Present the results of your playtesting session. Essentially, it is an oral version of the playtest chapter. Tell us who you recruited to play your game and how you organized the playtesting sessions. Summarize what you learned about your game. Was there a clear conclusion that you could draw from the feedback you received? Highlight any particular "gems" or comments that were especially useful. What changes to your game would you make based on the feedback you received?

3 Deliverables for this Milestone

- In class: Playtesting presentation
  - Describe your playtesting sessions and show their results
  - Highlight changes you are planning to make or have already implemented
  - Also mention aspects which would be nice to have but you won't have the time to implement
  - 10 to 15 minutes in total
- On the wiki (due one day before the milestone):
  - Writter report with Playtesting chapter
  - Playtesting slides

VI Milestone 6: Final Release and Conclusion

The final assignment encompasses the final presentation in class, the final conclusion chapter of the project notebook, and the public presentation of your work at the Demo Day. If you have enough time, you can also further polish your game at this stage (e.g. fix bugs, implement simple improvements suggested by the playtesters, adjust aspects where playtesters struggled) so the players at the Demo Day will see the very best version of your hard work during the semester.

1 Final Release Presentation

In the first part of the presentation, explain your vision for your game and how it fits the course theme. Summarize the main idea of your game and what makes it cool and different from existing ones. This is a great time to show the concept art or mock-ups you made during the design process. Feel free to bring your physical prototype. You might compare the original sketches with similar views from the final game. We want to see how the idea got started and how it progressed during the course. Highlight the technical challenges that you overcame. Tell us any major changes you made to the original design and why you made them. Were the changes made for technical reasons, due to playability, or a result of playtesting?

Try to make the presentation as fun, exciting, and entertaining as possible. Images, photos, screenshots, etc. are more exciting than text. Visual aids should back up what you are saying and help to convey your point. When discussing the development process, consider any specific stories or anecdotes that you could tell us. One or two specific anecdotes are more interesting than generalizations or summaries.

Once you have set the stage for your game and built some anticipation with the design sketches and development process, you should give a final live demo. Plan your demo ahead of time so that you show off the most interesting aspects of your game. **Don't just play!** You should offer comments throughout that connect your live demo to the ideas and issues that you just brought up during the first part of the presentation.

2 Conclusion Notebook Chapter

In this chapter, first provide a summary of your final results including screenshots from your final game. Comment on any significant changes from the alpha release. Next, this chapter should provide commentary about your experience during the class. How well did your initial design ideas materialize into the final game. Were you able to follow your development schedule, or did you deviate significantly from it? How did the different elements of the project structure (development schedule, prototype, playtesting, etc.) contribute to or hinder your progress? Conclude by giving your personal impression of the course. Did it meet your expectations? Are you happy and proud of your game? Do you feel there wasn't enough time or that the schedule was too compressed? Please provide an answer to these questions:

1. What was the biggest technical difficulty during the project?
2. What was your impression of working with the theme?
3. Do you think the theme enhanced your game, or would you have been happier with total freedom?
4. What would you do differently in your next game project?
5. What was your greatest success during the project?
6. Are you happy with the final result of your project?
7. Do you consider the project a success?
8. To what extend did you meet your project plan and milestones (not at all, partly, mostly, always)?
9. What improvements would you suggest for the course organization?

3 Final Digital Video

Since still images don't capture gameplay very well, we also require a short digital video that highlights the exciting aspects of your game. This video can be similar to a trailer video with gameplay or can only show gameplay with additional commentary. Make sure that everyone who watches the video knows what your game is about and what to expect when playing it.

4 Public Presentation at the Demo Day

We are publicizing the final presentation at the Demo Day of the faculty, so that other students, professors, and Munich's game community can play and admire your creation. Typically, the Demo Day takes place on Tuesday in the last week of the semester in the main hall of the Informatics building. Everyone is welcome, so please feel free to invite your friends and anyone interested. Make sure to look out for the Demo Day website, as instructions for participating (including the slide and poster template) and other details are provided there. Note that you have to sign up your group by yourself to the Demo Day organizers!

The schedule for the Demo Day typically looks like this:

1. One-minute-madness pitches of each attending group in one of the lecture halls. You will have 1 minute and 1 slide to very briefly pitch your game, such that everyone interested can come to your booth afterwards.
2. Show off your game at a booth in the faculty's main hall. Here you can present your game to other students and visitors and let them play your game. We (the practical's supervisors) are very likely to stop by and play as well. The booth at the Demo Day

should be supported by a poster about your game. It can include an overview of the game mechanics, the games story, or show the different development stages. You can also bring the prototype.

5 Deliverables for this Milestone

- In class: Presentation of the final game
  - Give a short overview over the entire project, the timeline and the final state
  - Discuss failures and achievements and your view of the final result
  - Show your short video and give a final live demo
  - Make sure to practice your timing, your challenge will be to compress all important information into the available time frame of 15 minutes in total
- At the Demo Day (usually on Tuesday in the last week of the semester):
  - One-minute-madness pitch
  - Live demo with a poster at your booth
- On the wiki (due one day before the milestone):
  - Written report with Conclusion chapter, including a summary of your finalizing changes to the game
  - Final release slides
  - Final digital video
  - Compiled version of the game
  - Source code of the game
  - (Demo Day poster)
- Via email to the supervisors **(due one week after Milestone 6!)**:
  - Individual percentual project contribution (sent by every team member individually), e.g.:
    - Member A: 30%
    - Member B: 40%
    - Member C: 30%
    - Additional explanation if necessary

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